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PROCEEDINGS. CONFERENCE, POLLUTION OF THE INTERSTATE WATERS OF LAKE CHAMPLAIN AND ITS TRIBUTARY BASIN, NEW YORK, VERMONT, HELD AT BURLINGTON, VERMONT ON 13 NOVEMBER 68 AND BOSTON, MASSACHUSETTS ON 19-20 DECEMBER 69

Federal Water Pollution Control Administration
Boston, Massachusetts

December 1969

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Enforcement Conference in the Matter of Pollution of the Interstate Waters of Lake Champlain and its tributaries at the Sheraton Motor Inn, Burlington, Vermont, on Wednesday, November 13, 1968, at 9:30 A.M.

PRESIDING:

Mr. Lester M. Klashman, Regional Director, Northeast Region, Federal Water Pollution Control Administration, U. S. Department of the Interior, Boston, Mass.

CONFEREES:

John C. Haberer, Assistant Commissioner, New York State Department of Health, 84 Holland Avenue, Albany, New York.

Alfred E. Peloquin, Executive Secretary, New England Interstate Water Pollution Control Commission, Boston, Mass.

Lester M. Klashman, Regional Director, Northeast Region, Federal Water Pollution Control Administration, U. S. Department of the Interior, Boston, Mass.

Reinhold W. Thieme, Commissioner of Water Resources, State of Vermont, State Office Building, Montpelier, Vermont.

CONFEREES (Continued):

Kenneth H. Walker, Director, North Atlantic Water Quality Management Center, Federal Water Pollution Control Administration, U. S. Department of the Interior, Edison, New Jersey.

PARTICIPANTS:

Honorable Philip H. Hoff, Governor, State of Vermont.

Reinhold W. Thieme, Commissioner, Department of Water Resources, State of Vermont.

A. William Albert, Director, Water Supply and Pollution Control, Department of Water Resources, State of Vermont.

David Clough, Chief of Water Quality, Department of Water Resources, State of Vermont.

Leonard Halnon, Chief Fishery Biologist, Vermont Fish and Game Department.

Blake Lawrence, Vermont Co-Chairman, Lake Champlain Committee.

Alfred Bromberg, Chief of Operations, Hudson-Delaware Basins Office, Federal Water Pollution Control Administration.

Dr. Clarence W. Tarzwell, Director, National Marine Water Quality Laboratory, Federal Water Pollution Control Administration, West Kingston, Rhode Island.

Max Abelson, Regional Coordinator, Northeast Region, United States Department of the Interior.

PARTICIPANTS (Continued):

Frank Panuzio , Chief of the Engineering Division of the New York District Corps of Engineers.

Alfred E. Peloquin, Executive Secretary, New England Interstate Water Pollution Control Commission.

Donald B. Stevens, Director, Bureau of Water Quality Management, State of New York.

Peter Paine, Lake Champlain Committee

George Rand, Vice President, International Paper Company, New York.

Edmund Morette, New York State Conservation Council.

THOSE IN ATTENDANCE:

Anthony Adamczyk, Sanitary Engineer, New York State Department of Health, Albany Regional Office, Albany, N. Y.

William Albert, Director, Water Supply and Pollution Control, State of Vermont, State Office Building, Montpelier, Vt.

R. H. Allen, International Paper Co., Box 2328, Mobile, Ala.

Ward I. Arnold, Assistant Director of Air and Water Management, International Paper Co., Glens Falls, N. Y.

Mrs. C. E. Baker, Office Manager, Lake Champlain Committee, P. O. Box 177, Charlotte, Vt.

Dirck Benson, Regional Supervisor for Fish and Game, New York State Conservation Department, Ray Brook, N.Y.

John F. Berthelsew, Chief, State Planning, Central Planning Office, Montpelier, Vt.

Frank O. Bogedain, Director, Bureau of Engineering Design, New York State Department of Health, Division of Pure Waters, Albany, N. Y.

Alfred Bromberg, Chief of Operations, North Atlantic Water Quality Management Center, Federal Water Pollution Control Administration, Edison, N. J.

K. D. Burnham, President, Essex County Development Corporation, Keeseville, N. Y.

Paul B. Carroll, International Paper Co., 220 East 42nd St., New York, N. Y.

THOSE IN ATTENDANCE (Continued):

John Ciancia, Chief, Industrial Wastes Section, North Atlantic Water Quality Management Center, Edison, N. J.

David L. Clough, Chief, Water Quality, Vermont Department of Water Resources, State Office Building, Montpelier, Vt.

Peter J. Coleman, Lake Champlain Committee, Charlotte, Vt.

Frederick N. Cook, Executive Director, Vermont Petroleum Association, P. O. Box 566, Montpelier, Vt.

Daniel V. Cotter, District Sanitary Engineer, New York State Department of Health, Queensburg Plaza, Glens Falls, N. Y.

Paul J. Cummings, Water Pollution Control Inv., Department of Water Resources, Montpelier, Vt.

S. L. Dickinson, Jr., Highway Engineer, Bureau of Public Roads, Federal Building, Montpelier, Vt.

Dana B. Dolloff, Air and Water Management Engineer, International Paper Co., Ticonderoga, N. Y.

Robert M. Drummond, Director, Air and Water Management, International Paper Co., 5 Main Street, Glens Falls, N. Y.

Frank J. Dwyer, District Engineer, New York State Conservation Department, Division of Water Resources, 137 Main Street, Warrensburg, N. Y.

Paul R. Elliot, Supervisory Investigator, U. S. Army Engineer District, New York, 26 Federal Plaza, New York, N. Y.

THOSE IN ATTENDANCE (Continued):

Willard B. Farnham, Industrial Waste Engineer, Vermont Department of Water Resources, Montpelier, Vt.

W. F. Farrell, Executive Director, Lake Champlain Committee, Essex, N. Y.

Edward V. Fitzpatrick, Deputy Director, North Atlantic Water Quality Management Center, Federal Water Pollution Control Administration, Edison, N. J.

Robert L. Foster, Graduate Student, University of Vermont, 48 Monroe Street, Burlington, Vt.

Keith Fry, Assistant to the Vice President, International Paper Co., 220 East 42nd Street, New York, N. Y.

Mrs. N. C. Garland, Vermont State Board, League of Women Voters, 5 Ridgewood Drive, Burlington, Vt.

David G. Gove, Project Engineer, Webster-Martin, Inc., South Burlington, Vt.

George W. Gove, Research Engineer, NCASI, Tufts University, Medford, Mass.

Frank X. Goss, Public Relations Manager, Northern Division, International Paper Co., P. O. Box 500, Glens Falls, N. Y.

D. N. Grimwood, State Conservationist, U. S. Department of Agriculture, Soil Conservation Service, 19 Church Street, Burlington, Vt.

Leonard C. Halnon, Chief Fishery Biologist, Vermont Fish and Game Department, Montpelier, Vt.

THOSE IN ATTENDANCE (Continued):

Perry A. Harding, Mill Manager, International Paper Co., Ticonderoga, N. Y.

Bertram R. Harper, International Business Machines, Box A, Essex Junction, Vt.

E. B. Henson, Director, Lake Champlain Studies Center, University of Vermont, Burlington, Vt

Merrill S. Hohman, Northeast Regional Office, Federal Water Pollution Control Administration, Boston, Mass.

W. H. Hollister, Director, Burlington Ecumenical Action Ministry, 152 Church Street, Burlington, Vt.

Dr. C. S. Houston, University of Vermont, College of Medicine (Former Member, President's Water Pollution Control Advisory Board), Burlington, Vt.

Charles J. Hubbard, Architect, Shelburne, Vt.

D. B. Johnstone, Professor of Microbiology, University of Vermont, Burlington, Vt.

Roy R. Kennedy, Secretary, New York-Vermont Interstate Comm., P. O. Box 667, Lake Placid, N.Y.

Fred Kent, Chief of Laboratory, Department of Water Resources, State Office Building, Montpelier, Vt.

William E. Kivett, Director, Environmental Sanitation, Clinton County Health Department, Box 337, Peru, N. Y.

Robert A. Klandl., University of Vermont, 26 Saratoga Avenue, Burlington, Vt.

Edwin R. Knox, Jr., Chief Engineer, Republic Steel

THOSE IN ATTENDANCE (Continued):

Corp., Adirondack Ore Mines, Port Henry, N. Y.

Reginald A. LaRosa, Chief, Engineering and Operations Section, Vermont Department of Water Resources, State Office Building, Montpelier, Vt.

Blake T. Lawrence, Vermont Co-Chairman, Lake Champlain Council, Charlotte, Vt.

Ted Manazir, Bacteriologist-Chemist Vermont State Department of Health, 115 Colchester Ave., Burlington, Vt.

Glenn H. Martin, Special Assignments Engineer, Vermont Highway Department, State Street, Montpelier, Vt.

R. P. Maslerman, Vice President-General Manager, International Paper Co., Glens Falls, N. Y.

Edward H. Meiser, Investigator, Albany Field Office, Harbor Supervision Branch, U. S. Army Corps of Engineers, P. O. Box 209, Troy, N. Y.

Denning Miller, Member, Vermont Water Resources Board, Edson Hill Road, Stowe, Vt.

Edmund Morette, Past President, New York State Conservation Council, 315 The Portage, Ticonderoga, N. Y.

James W. Morse, Aquatic Biologist, Department of Water Resources, Montpelier, Vt.

F. D. Murphy, District Engineer, U. S. Bureau of Public Roads, 16 Russell Rd., Albany, N. Y.

J. M. MacMartin, Director, Habitat Control Division, Vermont Department of Fish and Game, 151 Main

THOSE IN ATTENDANCE (Continued):

Street, Montpelier, Vt.

Marshall C. McGrath, Director, Government Relations, International Paper Co., 220 East 42nd Street, New York, N. Y.

C. S. Nichols, Assistant General Manager, International Paper Co., Glens Falls, N. Y.

Porter E. Noble, General Counsel, Vermont Yankee Nuclear Power, 77 Grove Street, Rutland, Vt.

John E. Nutting, Minister of Mission, Vermont Conference United Church of Christ, 285 Maple Street, Burlington, Vt.

Peter S. Paine, Jr., General Counsel, Lake Champlain Committee, Willsboro, N. Y.

Martin Pfeiffer, Conservation Biologist, New York State Conservation Department, Region 5, Ray Brook, N. Y.

Milton Potash, Professor, University of Vermont, Department of Zoology, Burlington, Vt.

G. H. Rand, Vice President, International Paper Co., 220 East 42nd Street, New York, N. Y.

Roland Raymond, District Director of Customs, St. Albans, Vermont District, Boston, Mass.

John V. Richards, Chief of Sanitary Engineering, Vermont Department of Health, 115 Colchester Avenue, Burlington, Vt.

Benjamin P. Robinson, Chief, Engineering Branch, HUD, MD, Region I, 26 Federal Plaza, New York, N. Y.

Andrew W. Ryan, Assemblyman Elect, Clinton & Essex Counties, 48 Court Street, Plattsburgh, N. Y.

THOSE IN ATTENDANCE (Continued):

Frederic O. Sargent, 330 Spear Street, South Burlington, Vt.

Kenneth Schueke, Acting Officer in Charge, U. S. Coast Guard, Burlington LAS, Box 533, Burlington, Vt.

John Scott, Student, University of Vermont, 6 South Street, Essex Junction, Vt.

Mrs. Gardner Soule, Harbor Road, Shelburne, Vt.

Mary Spargo, Managing Editor, New York Waters, Division of Pure Waters, New York State Department of Health, Albany, N. Y.

Lois Steele, Member Council, Lake Champlain Committee, 39 Cliff Street, Burlington, Vt.

Gordon B. Stensrud, Utilities Engineer, Vermont PSB, RFD #1, Box 213, Richmond, Vt.

Donald B. Stevens, Director, Bureau of Water Quality Management, New York State Health Department, 84 Holland Avenue, Albany, N. Y.

Richard F. Stiles, Water Pollution Control Investigator, Vermont Department of Water Resources, RFD #1, Morrisville, Vt.

Joseph F. Stothard, Terminal Superintendent, Mobil Oil-Albany, P. O. Box 868, Albany, N. Y.

John R. Strachan, Assistant A. G., Vermont, Montpelier, Vt.

Edward L. Tracy, Director, Environmental Sanitation, Vermont State Department of Health, Burlington, Vt.

THOSE IN ATTENDANCE (Continued):

John D. Tyson, Assistant Director, Government Relations, International Paper Co., 220 East 42nd Street, New York, N. Y.

F. D. Walter, Jr., Sanitary Engineer, New York State Department of Health, Glens Falls District Office, Glens Falls, N. Y.

Andrew M. Weist, Senior Sanitary Engineer, New York State Department of Health, Scotia, N. Y.

K. P. Wilson, SCS, State Conservation Engineer, U. S. Department of Agriculture, Soil Conservation Service, Burlington, Vt.

Mrs. Lyman Wood, Lake Champlain Committee, Charlotte, Vt.

Lyman Wood, Secretary-Treasurer, Lake Champlain Committee, Charlotte, Vt.

Jane Yamamoto, State Planner, Vermont Planning Council, Montpelier, Vt.

PRESS:

John P. Hamilton, Rutland Herald, Vermont Press Bureau, Montpelier, Vt.

George Lambert, WVNY TV, Channel 22, Box 22, Burlington, Vt.

Sam Levin, News Director, WJOY Radio, Joy Drive, South Burlington, Vt.

Marselis Parsons, WCAX TV and UPI, 100 Market Square, Burlington, Vt.

Stu Perry, Burlington Free Press, 278 College Street, Burlington, Vt.

S. R. Southworth, News Editor, Press-Republican, Plattsburgh, N. Y.

Elizabeth M. Taylor, Vermont ETV, Ethan Allen Avenue, Winooski, Vt.

PROCEEDINGS

OPENING STATEMENT
BY
MR. LESTER M. KLASHMAN

MR. KLASHMAN: The conference is open.

Mr. Murray Stein, Assistant Commissioner for Enforcement of the Federal Water Pollution Control Administration in the United States Department of the Interior, had planned to chair today's conference. Unfortunately, the weather has prevented his coming. I am substituting for him.

This conference in the matter of pollution of the interstate waters of Lake Champlain and its tributary basin, involving the States of Vermont and New York, the New England Interstate Water Pollution Control Commission, and the United States Department of the Interior, is being held under the provisions of Section 10 of the Federal Water Pollution Control Act.

We are here upon the invitation of Commissioner Reinhold W. Thieme of the Vermont Department of Water Resources, who wrote on behalf of the Vermont Water Resources Board, to the Federal Water Pollution Control Administration on August 12, 1968, requesting a conference.

[illegible] : Water quality, Lake Champlain [illegible] surveys; present water quality; [illegible] surveys; [illegible] surveys; [illegible] hydrology; water quality criteria and other related subjects. ←

Opening Statement - Mr. Klashman

Under the provisions of Section 10 of the Federal Water Pollution Control Act, the Secretary of the Interior is authorized to call a conference when so requested by a Governor, a State water pollution control agency or a municipality in whose request the Governor concurs.

The purpose of such a conference is to bring together representatives of the State and Interstate water pollution control agencies, the United States Department of the Interior, and other interested parties to review the existing situation and the progress which has been made, to lay a basis for future action by all parties concerned, and to give the States, localities, and industries an opportunity to take any indicated remedial action under State and local law.

The conference technique is rather an old one. It is used informally by many State agencies in the normal conduct of their business in the field of water pollution control. The conference system was proposed by the United States Supreme Court as long ago as 1921, in the famous case of New York versus New Jersey, involving interstate pollution. I would like to quote from this decision:

> "We cannot withhold the suggestion inspired by the consideration of this case, that the grave problem of sewage disposal by the large and growing population living on the shores of New York Bay is one more readily to be most

> wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

We strongly support the conference technique and we measure our success by the problems which are solved at the conference table, rather than in court. I think this is our chance, ladies and gentlemen, because at this stage we are given the most flexibility to come up with an equitable solution which will be satisfactory, and eminently satisfactory to all parties. Most of our cases have been solved at the conference stage.

As specified in Section 10 of the Federal Water Pollution Control Act, the Secretary of the Interior has notified the official State and interstate water pollution control agencies of this conference. This conference is between the official Vermont and New York State water pollution control agencies, the New England Interstate Water Pollution Control Commission and the Federal Water Pollution Control Administration of the United States Department of the Interior.

The State of Vermont has designated as its conferee for this conference Commissioner R. W. Thieme on my extreme left. The State of New York has designated Mr. John C. Haberer, who is representing Commissioner Dwight

Metzler, on my extreme right. The New England Interstate Water Pollution Control Commission has designated Mr. Alfred E. Peloquin. Mr. Kenneth H. Walker of the Federal Water Pollution Control Administration, of the Department of the Interior, has been designated as conferee for the Federal Government.

My name is Lester Klashman. I am from the Northeast Regional Office of the Federal Water Pollution Control Administration, Department of the Interior, in Boston, and I am representing the Department of the Interior.

The parties to this conference are the representatives of the States of Vermont and New York, the New England Water Pollution Control Commission and the Department of the Interior. Participation in this conference will be open to representatives and invitees of these agencies and such persons as inform me that they wish to present statements. However, only representatives of the States of Vermont and New York, the New England Interstate Water Pollution Control Commission, and the U. S. Department of the interior constitute the conferees.

Both the State and Federal governments have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have the primary rights and responsibilities for taking action to abate and control pollution. Consistent with this, we are charged by law to encourage the States in these activities.

At the same time, the Secretary of the Interior is charged by law with specific responsibilities in the field of water pollution control in connection with the pollution of both interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of these waters, whether the matter causing or contributing to the pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary, which endangers the health or welfare of any persons, shall be subject to abatement.

The Water Quality Act of 1965 amended the present Section 10 of the Federal Water Pollution Control Act to require the establishment of Water Quality Standards for all interstate waters in this Nation. Under the law, the States were given the opportunity to develop standards, which then become Federal Standards, when approved by the Secretary of the Interior.

Both New York and Vermont have submitted Water Quality Standards for the interstate waters within this conference area and both have been approved, with some specific criteria exceptions for Vermont by the Secretary.

There are some inconsistencies in the two standards. We hope that this conference will assist in reaching complete agreement on eliminating these differences.

One major step in achieving consistency is the reclassification and upgrading of New York waters from Class "C" to Class "B" south of Crown Point. Such an upgrading, for which a New York State hearing was held on October 9, 1968, would redesignate New York's lower Champlain waters as suitable for bathing and any other usage except as a source of water supply. If such upgrading were adopted and approved by the Secretary, only a small portion of Lake Champlain would be classified as "C",but suitable for fishing and wildlife habitat, recreational boating, and industrial processes and cooling.

Now a word about the procedures governing the conduct of the conference. The conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. In addition, we will call on other interested parties who wish to present statements. At the conclusion of each statement, the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the conferee's comments or questions I may ask a question or two. This procedure has proven effective in the past in reaching equitable solutions.

At the end of all the statements, we will have an executive session among the conferees and try to arrive at a basis of agreement on the facts of the situation. We will then attempt to summarize the conference orally, giving the conferees, of course, the right to amend or modify the summary.

In view of the fact that the Chairman designated by the Secretary is not here at the moment, it may be that we will adjourn the executive session for a later date before we come up with our complete conclusions and recommendations.

Under the Federal law, the Secretary of the Interior is required at the conclusion of the conference to prepare a summary which will be sent to the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of navigable waters subject to abatement under the Federal Act;
2. Adequacy of measures taken toward abatement of pollution; and,
3. Nature of delays, if any, being encountered in abating the pollution.

The Secretary is also required to make recommendations for remedial action if such recommendations are indicated.

A record and verbatim transcript of the conference is being made. This is being made for the purpose of aiding us in preparing a summary, and also a complete record of what is said here. The record will be held open for ten days to permit inclusion of any pertinent additional information and anyone who has not been able to get here and wishes to submit a statement. We will then make copies of the summary and transcript available to the official State and interstate water pollution control agencies involved.

We have found that, for the purpose of maintaining relationships within the State that the people who wish summaries and transcripts should request them through their State agency rather than coming directly to the Federal Government. The reason for this is that when the conference has been concluded we would prefer people who are interested in the problem to follow their normal relations in dealing with the State government rather than the Federal Government on these matters. This has worked successfully in the past and we will be most happy to make this material available to the Vermont and New York authorities for distribution.

I would like to ask that all speakers and participants other than the conferees making statements come to the lectern and identify themselves for purposes of the record.

It would also be appreciated if any of the participants who have statements will make copies available to the reporter, first of all, and to the conferees, if possible. The person who has probably the hardest job here will be the reporter. This is quite a chore at the end of the day and we can facilitate movement all along, if, wherever possible, we give her a copy of the written statement, which will enable us to proceed expeditiously.

Before going ahead, I would like to take this opportunity to introduce one of our distinguished visitors, and a former member of the President's Water Pollution Control Advisory Board who is a representative from Vermont. Dr. Houston.

Dr. Houston, do you want to stand up again?

I would now like to call on Mr. Miller who has a statement from the Governor that we would like to hear. Mr. Miller, that is a prepared statement, isn't it?

MR. MILLER: Yes, sir, it is.

Mr. Chairman, as you probably know, the Governor is out of the State, otherwise I am sure he would be here to welcome you in person. I am sure, in addition to this statement, he would like me to say he expresses his appreciation to those of you who have come considerable distance and especially difficult for those from New York State and Mr. Peloquin and representatives from the Department of the Interior; I am sure he appreciates it very much.

This is the statement which the Governor has asked me to read.

STATEMENT OF HON. PHILIP H. HOFF, GOVERNOR OF THE STATE OF VERMONT, AS READ BY MR. DENNING MILLER, MEMBER, VERMONT WATER RESOURCES BOARD

It is a pleasure for me to welcome to this conference representatives of the Federal Government, our friends from New York State, and my fellow Vermonters.

As you know, this conference was convened at my request under provisions of the Clean Waters Act of 1965 to explore methods for alleviating a condition which is deleterious to the waters of Lake Champlain over which Vermont has jurisdiction.

As you will note from the examination of data furnished by the Department of Water Resources and other pertinent State agencies, our case is thoroughly documented. In brief, we allege that accumulations of massive sludge deposits directly attributable to the operation of the International Paper Company plant at Ticonderoga have seriously degraded the waters of this lake.

Lake Champlain is Vermont's primary single recreation resource. Its protection is crucial to the well-being of 25 percent of our population which utilizes the lake extensively.

The disparity between Vermont's classification of the lake's waters and the classification designation employed by New York has necessitated adjudication by the Department of the Interior. Classification, of course, is merely the beginning of an involved and expensive process of pollution abatement. It is a means rather than an end. But I think it significant that Vermonters have committed themselves both to a classification system of highest possible use and to a substantial public investment in the attainment of these classifications. The protection of that public investment is a clear responsibility of State government. The cognizance of that responsibility necessitates this hearing.

We are mindful of the enormous difficulties, both economic and technical, which accompany pollution abatement.

These difficulties are perhaps most readily apparent in the operations of the pulp and paper-making industry. But we are insisting on exacting standards on the part of Vermont industries which utilize public waters in our State. We can do no less in our negotiations with industries from neighboring States.

We will seek to show that the deposits of sludge to which I earlier referred constitute a serious detriment to the attainment of that classification for the waters of Lake Champlain which has been promulgated by the State of Vermont.

Although the Federal representatives here today have elected to consider the issue of the lake in its entirety, I am in hopes that the primary purpose of this conference will remain clearly in focus. We have requested the Federal Government to exercise its jurisdiction over one specific problem, the degradation of our waters by industry operating in a neighboring State.

We are perfectly willing to concede that difficulties may exist within our jurisdiction which might temporarily delay the implementation of a "B" classification for Lake Champlain. But we are moving in several areas to resolve our own enforcement problems within the requirements spelled out by the Department of the Interior.

The decision by International Paper to close its Ticonderoga plant has, in part, precipitated our request for this hearing.

We are encouraged by technical information conveyed to us concerning abatement apparatus at I.P.'s proposed new plant. But the new plant, it seems to me, is not at issue today. We are seeking the assistance of appropriate Federal agencies in the abatement of a condition which has persisted for far too long.

I would like to thank the Department of the Interior for taking cognizance of this condition and for the equitable judgment I know its representatives will utilize in helping us to ameliorate it.

MR. MILLER: Thank you, Mr. Chairman.

MR. KLASHMAN: Thank you very much. The Vermont authorities have a prepared statement, as I understand it, so we will proceed with that first. As I understand it, you are going to give a statement but for the record it will be a prepared statement.

Mr. Thieme.

STATEMENT OF REINHOLD W. THIEME, COMMISSIONER, DEPARTMENT OF WATER RESOURCES, STATE OF VERMONT, STATE OFFICE BUILDING, MONTPELIER, VT.

MR. THIEME: Thank you, Mr. Chairman. I think to make very clear several points I am going to read one page, at the most two pages, from the prepared report which is being submitted. The first point that I would like to make abundantly clear are the terms under which Vermont requested the conference to be held and in my letter to the Administration as contained in the front of the report I would read as follows: The letter is addressed to Mr. Klashman, Regional Director, Northeast Regional Office, Federal Water Pollution Control Administration, John F. Kennedy Federal Office Building, Boston, Mass. August 12, 1968

Dear Mr. Klashman:

Pursuant to the provisions of Section 10 (D) Public Law 84-660, as amended, the Water Resources Board of the State of Vermont hereby requests that the Secretary of the Interior convene a conference in the matter of pollution of waters of the State of Vermont by wastes discharged into Ticonderoga Bay of Lake Champlain from the pulp and paper industry now and previously situated on Ticonderoga Creek in the vicinity of Ticonderoga, New York.

The above mentioned pollution of Vermont waters is evidenced by floating masses of sludge which originate in Ticonderoga Bay and by severely depressed dissolved oxygen levels in Vermont waters adjacent to Ticonderoga Bay. The pollution of these Vermont waters constitutes an aggravation to Vermont residents. It is also believed that the presence of these benthal deposits will prevent the complete realization of the future best uses contemplated for these waters under our Implementation Plan for Lake Champlain as submitted by Vermont and approved by Secretary Udall.

Extensive studies were made in this area during the summers of 1965 and 1966. The information obtained was submitted to your Metuchen, New Jersey office as part of the Hudson River-Lake Champlain project.

Sincerely,
/s/ R. W. Thieme
Commissioner

This was the basic request and it forms the introduction to our report, Mr. Chairman, and since the procedures are such that we will stick to prepared testimony, I would make brief reference to those we have present and then go to the prepared statement. But so that you know what we are prepared to present at an appropriate time during the conference I have an introduction.

Actually, the State of Vermont has prepared this report with considerable data background to be considered. We are prepared to go in considerable depth to support this material if it is required during the presentation, and just by way of brief mention of those that are present and prepared to testify, if so required, they will include Mr. A. William Albert, the Director of Water Pollution and Water Supply Division of the Department of Water Resources; Mr. David Clough, who is in charge of our Water Quality operations; Mr. Reginald A. LaRosa, who is Sanitary Engineer in charge of our Engineering and Operations Branch; Mr. Willard Farnham, who was at that time in charge of our laboratory, now in industrial engineering aspects; Mr. Fred Kent, who is presently Chief of Laboratory; Mr. James Morse, Aquatic Biologist; Mr. Paul Cummings and Mr. Richard Stiles, both Water Pollution Control Investigators for the Department; and then others from State government, Leonard Halnon, James MacMartin, who are fisheries experts in the Fish and Game Department; Mr. Edward Tracy and Mr. John Richards from the Department of Health; Gordon Stensrud from the Public Service Board; and Bernard Johnson, Central Planning Office. These men are here and prepared to testify if it is necessary in support of the material that is contained in our report. By way of presentation of the background, Mr. Chairman, I would suggest in the interest of time that rather than present the material contained in the report in its entirety that we limit our present submission to a presentation of the Summary section that is also included therein and, for this part, I would ask Mr. A. William Albert if he would come forward and present the Summary statement as contained in our report.

By way of introduction, the report which has been prepared is essentially a hand-done version with photographs and documentation has been extremely difficult for us to reproduce large numbers. Accordingly, we have reproduced the summary section in a large number and these certainly will be available to all of those who have interest in them.

STATEMENT OF MR. A. WILLIAM ALBERT, DIRECTOR, WATER SUPPLY AND POLLUTION CONTROL, DEPARTMENT OF WATER RESOURCES, STATE OF VERMONT

MR. ALBERT: Thank you, Mr. Chairman.

As a point of introduction, there were six reports made of the large report including an analysis distributed to the Department of the Interior. One has been given to the State of New York and one has been given to the International Paper Company. The following statement which I will read is contained in the forefront of that report.

This report is entitled "Summary Report on Water Quality Lake Champlain-Ticonderoga Bay Area and Adjacent Vermont Waters".

The paper industry at Ticonderoga, New York, has discharged wastes from its pulp and paper-making operations into Ticonderoga Bay for many years. These operations have resulted in the deposition of a massive sludge blanket on the floor of the Bay with an accompanying decrease in water depth from over 18 feet to less than two feet in some locations. These deposits are in anaerobic, that is septic and decay as evidenced by the constant emission of gas bubbles from the surface waters. The escaping gas is extremely malodorous and noxious, as it is composed largely of hydrogen sulfide with its characteristic odor of rotten eggs.

The Vermont Department of Water Resources conducted a water quality study in the Ticonderoga Bay area in 1965. In 1966 the Department made further studies in the Bay area in cooperation with the New York State Health Department and the Federal Water Pollution Control Administration. A biological survey was performed by the Department in September 1968. These studies indicate that pollution in Ticonderoga Bay seriously affects water quality beyond Larrabee's Point on the north and as far south as Chipman Point. Dissolved oxygen was found to be absent in Ticonderoga Bay and in the Vermont portions of the lake adjacent to the Bay. Dissolved oxygen levels were severely depressed as far north as Larrabee's Point and somewhat depressed north of this point. The total lake area known to be seriously affected by the wastes entering Ticonderoga Bay and its sludge deposits is approximately 1,450 acres of which 605 acres are Vermont waters.

The waters of the Bay are extremely unappealing from an aesthetic viewpoint. The water is dark gray to black in appearance and often contains floating sludge mats raised from the bottom by severe gasification in the underlying sludge deposits. On July 11, 1967, a complaint from the Buoy 39 Marina, just north of Chipman Point, was investigated by the Water Resources Department. The investigation indicated that a massive sludge lift due to severe gasification in Ticonderoga Bay had occurred. The floating mass of sludge was blown across the lake into the small bay on the Vermont shore where the marina is located and remained until broken up by the agitation created by passing marine traffic. The marina owners report that this is a constantly recurring problem which is severely affecting their business with the transient boat traffic on the lake.

The severity of the pollution in Ticonderoga Bay is further evidenced by the following:

1. Biochemical oxygen demand (B.O.D.) values as high as 205 mg/1 have been measured. Normal B.O.D. values to be expected in a lake of this nature would be less than 1 mg/1.
2. Dissolved oxygen (D.O.) values as low as 0.0 mg/1 have been measured indicating completely septic conditions. Normal dissolved oxygen levels in a lake of this nature would average near saturation and be in range of 7-9 mg/1 depending upon the water temperature.

3. Coliform bacteria levels as high as 3,100,000 per 100 ml have been measured. Normal coliform levels in a pollution free lake might vary from 0-100 per 100 ml. Vermont interstate water quality standards for Class B water, suitable for swimming, call for coliform levels less than 1,000 per 100 ml.

4. Biological survey results indicate that no bottom dwelling organisms are present in Ticonderoga Bay and that midge fly larvae, a type of bloodworms, are the only organisms present on the lake floor in the adjacent Vermont waters. And, as an aside, I might add that these are accepted indices of gross pollution.

5. Area residents report that fishing in the lake is poor as far north as the West Bridport area. When fish are caught they are inedible because of their poor taste which has been described as being similar to the odor from the paper mill.

The Division of Industrial Hygiene of the Vermont State Department of Health reports that there appears to be a substantial air pollution problem occurring as a result of the hydrogen sulfide emanating from the waters of Ticonderoga Bay due to the decomposing sludge deposits on the floor of the Bay. It is their opinion, as expressed by letter to the Department of Water Resources, dated July 26, 1968, that the shoreline residents of the area would still be subject to an air pollution problem from the bay, even if the mill air pollution was completely eliminated. I would add that the letter which I have just cited is contained in the basic report.

The International Paper Company is presently planning to move their operation from the present location at Ticonderoga, New York to a site on Lake Champlain approximately four miles north. It is expected that the new plant will incorporate adequate water pollution control facilities. To date, the Department of Water Resources has received no information from any source relative to correcting the conditions in Ticonderoga Bay and the surrounding waters. This Department expects that these waters will remain in their present condition for many years due to the massive sludge deposits in the bay unless remedial action, such as dredging, is undertaken. It is for this reason that this Federal conference was requested.

A map depicting present water quality in the Ticonderoga Bay area as determined by the survey results is attached and the interpretation of this map is on the basis of the New England Interstate Water Pollution Control Commission standards and that is identifying the parameters which I have recently gone over. We have tried to key this section of the lake to indicate the classes which presently exist and it can be seen that the lake which has been classified as "B" by the State of Vermont in many places doesn't even approach Class D.

This concludes my statement, Mr. Chairman.

MR. KLASHMAN: Are there any questions? Mr. Haberer? Mr. Peloquin?

MR. PELOQUIN: No.

MR. KLASHMAN: Mr. Albert, I would like to ask you a couple of questions, if I might. This floating sludge that has come across the lake, is this a common occurrence?

MR. ALBERT: Yes, it is. It occurs principally in the warm months, and we have men who have observed this more often than I have, but my experience is that it occurs in July and August, which is what we would expect when the water warms and gasification can occur.

MR. KLASHMAN: Another thing I would like to clarify for the record. You referred to this table which will appear in the report. Could you please describe where this "D" section which you spoke about occurs? As I understand it, you have it.

MR. ALBERT: We have a hatch there, kind of a cross-hatched area if you will look at the table which is designated, the key reads Class D or below.

MR. KLASHMAN: What I meant, Mr. Albert, would you describe it in words so that it would show up in the record? Can you describe the area?

MR. ALBERT: I would describe the area as extending south of the Buoy 39 Arena and extending slightly up above Larrabee's Point. In all fairness, this extension is based on broad lake surveys; it could be 100 feet or 200 feet, either way. This is intended to portray a general area.

MR. KLASHMAN: And this was on both sides of the lake, both in Vermont and New York?

MR. ALBERT: Yes. The general water quality in that area, both from a chemical, bacteriological, physical viewpoint is one of extremely low oxygen. The water is dark; it is very unappealing in appearance; floating solids are evident; and there is a great lack of normal aquatic biota and in some areas when the gas from these sludge deposits rise it smells odorous.

MR. KLASHMAN: The floating solids occur just at the map marina or in other parts of the shoreline? You talk about them going across into the small bay where the marina is located. Is it only in the marina that you saw the solids?

MR. ALBERT: The solids, particles of the solids are evident on the basis of the surveys that have been given to me, plus my own observation. It is in the entire shaded area.

MR. KLASHMAN: The entire area. The other question - what about the 0.0 dissolved oxygen, 0.0 mg/1 dissolved oxygen, did you find that in the whole area that you are talking about or in specific places?

MR. ALBERT: On that particular question, I will have to refer it to somebody else. I will get Mr. Clough.

MR. KLASHMAN: Here is a copy right here.

MR. ALBERT: In the interest of expediting this I will have Mr. Clough clarify it for me because he did the actual work. I now must ask for Mr. Clough who was on the team that did this work.

MR. KLASHMAN: Mr. Clough, would you identify yourself please for the record?

MR. CLOUGH: My name is David Clough. I am Chief of Water Quality for the Department of Water Resources.

STATEMENT OF DAVID CLOUGH, CHIEF, WATER QUALITY, VERMONT DEPARTMENT OF WATER RESOURCES

MR. CLOUGH: I am afraid that the handouts we have distributed don't include the answer to the question but tho main report which we have submitted does. Now you were concerned with D.O. at this point?

MR. KLASHMAN: Yes, the 0.0 dissolved oxygen.

MR. CLOUGH: O. K. On Table IV in the main report which we have submitted the 0.0 D.O. occurred principally around Station 195A and 195.

MR. KLASHMAN: And where are they?

MR. CLOUGH: Those are depicted on the map which was attached to the Summary distributed. Station 195 was a cross-sectional line taken across, more or less, at the mouth of Ticonderoga Creek as it enters the lake. Stations A, B, C and D for this section established are running in a generally west to east direction.

MR. KLASHMAN: This goes from Independence Point over towards --

MR. CLOUGH: No. Station 195, which is on the map also, is the one that runs from Independence Point over to approximately where the fort is located.

MR. KLASHMAN: And this whole cross-section you found 0.0?

MR. CLOUGH: I will have to refer to the data; I believe they were. During the 1966 survey at Station 195A on 8/16/66 we had 0.6. That is apparently the lowest one at that 195 Station for that particular year. At Station 195A we had a 0.0 D.O. at Station D on that section. That would actually be in New York water.

MR. KLASHMAN: What about in Vermont, what are the low levels that you have actually in Vermont?

MR. CLOUGH: This goes now to the 1965 data which is in Exhibit 1 of the main report which we have submitted to you. There are several 0.0 D.O.s there.

MR. KLASHMAN: On the Vermont side?

MR. CLOUGH: Under Station 195 on 8/26/65 we get consistent 0.0 dissolved oxygen at that cross-section all the way at the Vermont end and New York. We felt that for purposes of this report that we would consider it as Stations B and C. At Station 195 at Stations B and C on that lateral section across the lake we considered that Station B and Station C were indicative of water quality in Vermont. Station B is roughly right on the border and Station C is well within the Vermont portion of the lake, and at that date those three Stations across there were all levels of 0.0 D.O. in the lake at that time.

MR. KLASHMAN: Thank you very much. The other question I wanted to ask you - I don't know, Mr. Albert, whether you want Mr. Clough to answer this. On the bacteria with the 3,000,000 level coliforms here, does that also occur in Vermont?

MR. CLOUGH: No, I believe that actually occurred in Ticonderoga Bay itself.

MR. KLASHMAN: What are the high levels that you have over in Vermont?

MR. CLOUGH: High levels in Vermont. Let's see the 1966 data, there is a 91,000 figure at Station 193A. That would probably be in New York though. A 79,000 figure at Station 193C, that would be in Vermont.

MR. KLASHMAN: Now where is 193C?

MR. CLOUGH: 193C is a lateral section across the lake between Ticonderoga Point and the Vermont shore; this would be just north of the Fort.

MR. KLASHMAN: That's going directly from Ticonderoga Point directly east?

MR. CLOUGH: East. Right.

MR. KLASHMAN: And on the Vermont side of that cross-section you had of the value of 79,000?

MR. CLOUGH: Right.

MR. KLASHMAN: Do you do any fecal coliform?

MR. CLOUGH: No, fecal coliform were not done.

MR. KLASHMAN: Now, may I ask you one more question, Mr. Clough or Mr. Albert. Excuse me, were you finished with the bacteria?

MR. CLOUGH: Yes.

MR. KLASHMAN: I would like to ask about this: You made this statement that the area residents report that fishing in the lake is poor as far north as Bridport. When fish are caught they are inedible because of their poor taste which has been described as being similar to the odor from the paper mill.

MR. CLOUGH: Yes. Where is West Bridport?

MR. KLASHMAN: Well, first, where is West Bridport, yes. Can you put the map on? Maybe we can. We have a map that might show it. Can you see it on this map, Mr. Clough?

MR. CLOUGH: All right, West Bridport is roughly opposite Crown Point.

MR. KLASHMAN: All right, fine.

MR. CLOUGH: This area here, sir.

MR. KLASHMAN: The question that concerns me, and I don't know whether, Mr. Thieme, you want a biologist to answer this or you want Mr. Albert to. Do I understand that you are saying the fish from New York are apparently coming over into Vermont or are you saying that the effects from the discharges are coming over and affecting your fish?

MR. THIEME: To identify more specifically the part that you are looking at here, I would suggest that you look at Exhibit 5 in the report itself, and in the Exhibit 5 there is an identification of some fourteen different interviews that were had with people on the Vermont side, and it is as a result of these interviews that this material is contained. Dave, do you recall specifically which individuals who made such references?

MR. CLOUGH: Not offhand. It's there in the report. I think there were two or three and I personally talked with people down there who had reported they had a sulphurous taste and the fish seemed to be inedible in that sense.

MR. THIEME: One of the reports, No. 6 in the report is a brief on interview with Mr. Charles Leazer, R.F.D., Orwell, Vermont, and the last sentence of this reads: "The fishing is very bad in this area and if you do catch a fish you can't eat it as it will taste very bad, just the way the Ticonderoga Mill smells like. My boating business has gone down each year . . . ." This is one of the references to the fish, bad taste and odors.

MR. KLASHMAN: We might want to explore this further later.

MR. THIEME: We are prepared. We have people from the Fish and Game Department and I am sure that they could add some comments to this at the appropriate time.

MR. KLASHMAN: Fine. Thank you very much.

Do you want to call your next witness?

MR. THIEME: Mr. Chairman, I would say with this we present our report to the Chairman. I would suggest that it be the pleasure of the Chair that the report prepared by Vermont now be presented and we would ask that it be incorporated in the record as a whole. With regard to the balance of our presentation, Mr. Chairman, in the interest of time, perhaps it would be well if the other conferees presented briefs, and we are prepared to go into as much detail to support our case.

MR. KLASHMAN: Mr. Thieme, do you have any other people that wanted to testify from Vermont?

MR. THIEME: None that have identified themselves to me.

MR. KLASHMAN: Your report will be included in the record*, except I would like to point out that the pictures in color, No. 3, 4 and 5 and 6 and any others cannot be reproduced due to some limitations we have.

MR. THIEME: Mr. Chairman, I feel they are graphic enough so that even when reproduced in black and white they will convey their message.

MR. KLASHMAN: Thank you.

MR. THIEME: We spent some time trying to contain

(The above-mentioned report follows.)

REPORT ON WATER QUALITY
LAKE CHAMPLAIN-TICONDEROGA BAY AREA
AND
ADJACENT VERMONT WATERS

VERMONT DEPARTMENT OF WATER RESOURCES
NOVEMBER 1968

REPORT ON WATER QUALITY
LAKE CHAMPLAIN-TICONDEROGA BAY AREA
AND
ADJACENT VERMONT WATERS

VERMONT DEPARTMENT OF WATER RESOURCES
NOVEMBER 1968

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WATER SUPPLY &
POLLUTION CONTROL DIVISION

REINHOLD W. THIEME, P. E.
COMMISSIONER OF WATER RESOURCES

STATE OF VERMONT
DEPARTMENT OF WATER RESOURCES
MONTPELIER
05602

November 4, 1968

Mr. Reinhold W. Thieme
Commissioner of Water Resources
Montpelier, Vermont

Transmitted herewith is a summary report of water quality in the Ticonderoga Bay area of Lake Champlain prepared by the staff of the Water Supply and Pollution Control Division.

This report summarizes existing water quality from Stony Point on the south to Crown Point on the north as evidenced by water quality surveys, staff observations, and interviews with shoreline residents and other interested persons.

Respectfully submitted,

William Albert

William Albert, Director
Water Supply and Pollution Control

August 12, 1968

Mr. Lester M. Klashman
Regional Director
Northeast Regional Office
Federal Water Pollution Control Administration
John F. Kennedy Federal Office Building
Boston, Mass. 02203

Dear Mr. Klashman:

Pursuant to the provisions of Section 10 (D) Public Law 84-660, as amended, the Water Resources Board of the State of Vermont hereby requests that the Secretary of the Interior convene a conference in the matter of pollution of waters of the State of Vermont by wastes discharged into Ticonderoga Bay of Lake Champlain from the pulp and paper industry now and previously situated on Ticonderoga Creek in the vicinity of Ticonderoga, New York.

The above mentioned pollution of Vermont waters is evidenced by floating masses of sludge which originate in Ticonderoga Bay and by severely depressed dissolved oxygen levels in Vermont waters adjacent to Ticonderoga Bay. The pollution of these Vermont waters constitutes an aggravation to Vermont residents. It is also believed that the presence of these benthal deposits will prevent the complete realization of the future best uses contemplated for these waters under our Implementation Plan for Lake Champlain as submitted by Vermont and approved by Secretary Udall.

Extensive studies were made in this area during the summers of 1965 and 1966. The information obtained was submitted to your Metuchen, New Jersey office as part of the Hudson River-Lake Champlain project.

Sincerely,

S/ R. W. Thieme

Commissioner

RWT:ms
cc: Governor Philip H. Hoff

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

SEP 20 1968

Dear Mr. Thieme:

On the basis of your written request, dated August 12, 1968, and on the basis of reports, surveys, or studies, in accordance with section 10 of the Federal Water Pollution Control Act (33 U.S.C. 466 et seq.), I hereby call a conference in the matter of pollution of the interstate waters of Lake Champlain and its tributary basin (New York-Vermont). The conference will convene on November 13, 1968, at 9:30 a.m., E.S.T., at the Sheraton Motor Inn, Williston Road, Burlington, Vermont. Mr. Max N. Edwards, Assistant Secretary for Water Pollution Control, U. S. Department of the Interior, will attend and open the conference. I have designated Mr. Murray Stein, U. S. Department of the Interior, as chairman of the conference.

Participation in the conference will be limited to representatives of the U. S. Department of the Interior, and such persons as are designated by your Department, the New York State Department of Health, and the New England Interstate Water Pollution Control Commission.

The conference will cover all interstate pollution problems of Lake Champlain and its tributaries. As specified in the Federal Water Pollution Control Act, we will furnish a summary of the conference discussions to your Department, the New York State Department of Health, and the New England Interstate Water Pollution Control Commission.

Sincerely yours,

(sgd) Stewart L. Udall

Secretary of the Interior

Mr. Reinhold W. Thieme
Commissioner of Water Resources
Department of Water Resources
Montpelier, Vermont 05602

SUMMARY

The paper industry at Ticonderoga, New York has discharged wastes from its pulp and paper-making operations into Ticonderoga Bay for many years. These operations have resulted in the deposition of a massive sludge blanket on the floor of the Bay with an accompanying decrease in water depth from over 18 feet to less than two feet in some locations. These deposits are in anaerobic (septic) decay as evidenced by the constant emission of gas bubbles from the surface waters. The escaping gas is extremely malodorous and noxious, as it is composed largely of hydrogen sulfide with its characteristic odor of rotten eggs.

The Vermont Department of Water Resources conducted a water quality study in the Ticonderoga Bay area in 1965. In 1966 the Department made further studies in the Bay area in co-operation with the New York State Health Department and the Federal Water Pollution Control Administration. A biological survey was performed by the Department in September 1968. These studies indicate that pollution in Ticonderoga Bay seriously affects water quality beyond Larrabee's Point on the north and as far south as Chipman Point. Dissolved oxygen was found to be absent in Ticonderoga Bay and in the Vermont portions of the lake adjacent to the Bay. Dissolved oxygen levels were severely depressed as far north as Larrabee's Point and somewhat depressed north of this point. The total lake area known to be seriously affected by the wastes entering Ticonderoga Bay and its sludge deposits is approximately 1,450 acres of which 605 acres are Vermont waters.

The waters of the Bay are extremely unappealing from an aesthetic viewpoint. The water is dark gray to black in appearance and often contains floating sludge mats raised from the bottom by severe gasification in the underlying sludge deposits. On July 11, 1967 a complaint from the Buoy 39 Marina, just north of Chipman Point, was investigated by the Water Resources Department. The investigation indicated that a massive sludge lift due to severe gasification in Ticonderoga Bay had occurred. The floating mass of sludge was blown across the lake into the small bay on the Vermont shore where the marina is located and remained until broken up by the agitation created by passing marine traffic. The marina owners report that this is a constantly recurring problem which is severely affecting their business with the transient boat traffic on the lake.

The severity of the pollution in Ticonderoga Bay is further evidenced by the following:

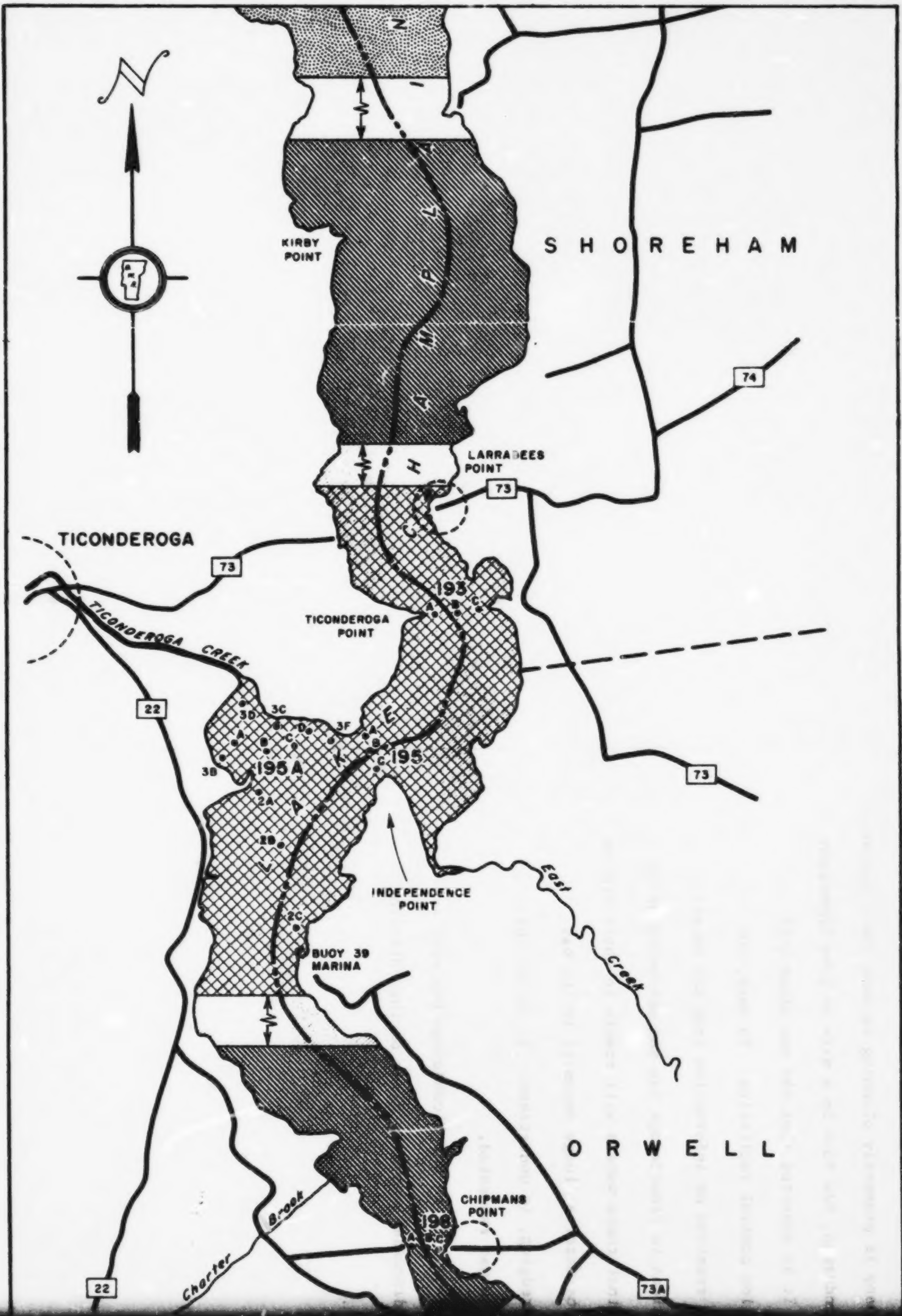
1. Biochemical oxygen demand (B.O.D.) values as high as 205 mg/l have been measured. Normal B.O.D. values to be expected in a lake of this nature would be less than 1 mg/l.
2. Dissolved oxygen (D.O.) values as low as 0.0 mg/l have been measured indicating completely septic conditions. Normal dissolved oxygen levels in a lake of the nature would average near saturation and be in range of 7-9 mg/l depending upon the water temperature.
3. Coliform bacteria levels as high as 3,100,000 per 100 ml have been measured. Normal coliform levels in a pollution free lake might vary from 0-100 per ml. Vermont interstate water quality standards for Class B water, suitable for swimming, call for coliform levels less than 1,000 per 100 ml.
4. Biological survey results indicate that no bottom dwelling organisms are present in Ticonderoga Bay and that midge fly larvae (bloodworms) are the only organisms present on the lake floor in the adjacent Vermont waters.
5. Area residents report that fishing in the lake is poor as far north as the West Bridport area. When fish are caught they are inedible because of their poor taste which has been described as being similar to the odor from the paper mill.

The Division of Industrial Hygiene of the Vermont State Department of Health reports that there appears to be a substantial air pollution problem occurring as a result of the hydrogen sulfide emanating from the waters of Ticonderoga Bay due to the decomposing sludge deposits on the floor of the Bay.

It is their opinion, as expressed by letter to the Department of Water Resources dated July 26, 1968, that the shoreline residents of the area would still be subject to an air pollution problem from the bay, even if the mill air pollution was completely eliminated.

The International Paper Company is presently planning to move their operation from the present location at Ticonderoga, New York to a site on Lake Champlain approximately four miles north. It is expected that the new plant will incorporate adequate water pollution control facilities. To date, the Department of Water Resources has received no information from any source relative to correcting the conditions in Ticonderoga Bay and the surrounding waters. This Department expects that these waters will remain in their present condition for many years due to the massive sludge deposits in the bay unless remedial action, such as dredging, is undertaken. It is for this reason that this Federal conference was requested.

A map depicting present water quality in the Ticonderoga Bay area as determined by the survey results discussed above is given on the following page.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BUOY 39 MARINA
CHIPMANS POINT
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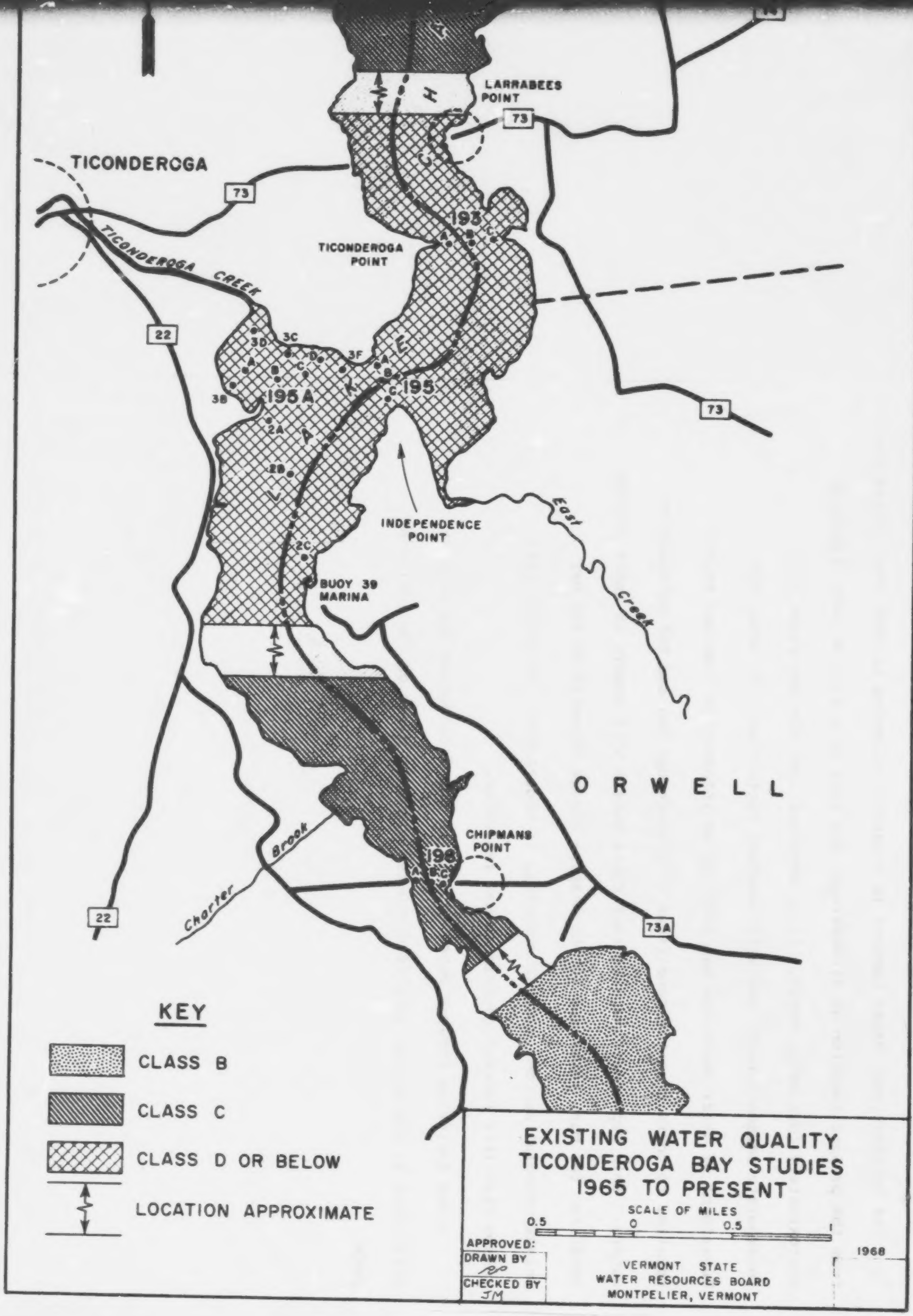

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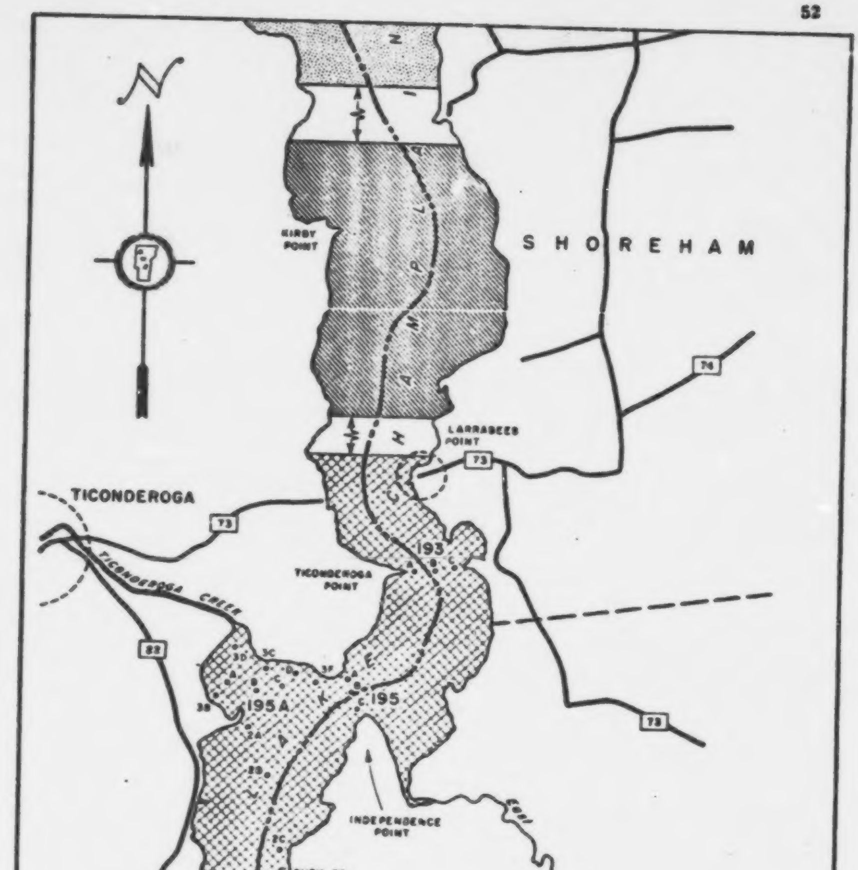
EXISTING WATER QUALITY
TICONDEROGA BAY STUDIES
1965 TO PRESENT

VERMONT STATE
WATER RESOURCES BOARD
MONTPELIER, VERMONT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EXISTING WATER QUALITY
TICONDEROGA BAY STUDIES
1965 TO PRESENT

VERMONT STATE
WATER RESOURCES BOARD
MONTPELIER, VERMONT

SURVEY PROGRAMS

The Vermont Department of Water Resources conducted extensive water quality surveys in the Ticonderoga Bay area between Chipman Point and Five Mile Point during the summers of 1965 and 1966.

The 1965 summer survey was conducted over a four day period from August 24 through August 27. Lake samples were collected at the three lateral quarter points for each of four cross-sectional locations identified below. In addition, Ticonderoga Bay was sampled at four lateral locations off the mouth of Ticonderoga Creek. Station locations are indicated on Figures 1 and 2, Appendix II.

Station 198 - A,B,C: At Chipman Point
Station 195A - A,B,C,D: Mouth of Ticonderoga Creek
Station 195 - A,B,C: At Independence Point
Station 193 - A,B,C: At Ticonderoga Point
Station 190 - A,B,C: At Five Mile Point
Note: Locations A,B,C,D are positioned West to East

A total of sixty samples were collected at the above stations and analyzed at the Department's mobile laboratory truck located at Shoreham, Vermont. Water quality analyses included temperature, dissolved oxygen, B.O.D., pH, chlorides, color, turbidity, and coliform bacteria. Survey results are tabulated as Exhibit 1, Appendix I.

A co-operative survey of the International Paper Company plant effluent and the receiving waters was undertaken by the Hudson-Champlain Project of the Federal Water Pollution Control Administration, New York State Department of Health, and the Vermont Department of Water Resources during the period of August 15-18, 1966. Plant effluent analyses and Ticonderoga Creek studies were performed by personnel from the Federal Water Pollution Control Administration and the State of New York. Lake sampling and analyses were performed by Vermont personnel. A complete report by the Federal Water Pollution Control Administration of these co-operative efforts is contained in Appendix I as Exhibit 2.

To supplement the lake cross-sections sampled in 1965, samples were collected at the following additional locations in 1966.

Station 202 - A,B,C: At Stony Point
Station 183 - A,B,C: At Putnam Creek Near Crown Point
Station 182 - A,B,C: At Chimney Point

Including sections 198, 195A, 195, 193 and 190 described previously, a total of seven cross sectional areas and the lateral section at the mouth of Ticonderoga Creek were sampled in 1966. A total of 89 samples were collected at the above stations and analyzed at the Department's mobile laboratory truck. Water quality analyses included temperature, pH, D.O., B.O.D., total solids, fixed solids, chlorides, color, turbidity, and coliform bacteria. Analytical results are contained within the Federal Water Pollution Control Administration report in Appendix I.

To verify previous data and update information on existing conditions a dissolved oxygen and benthic organism study was made of the lake area between Chipman's Point and Larrabee's Point on September 17, 18, 25, 26, 1968. In addition to stations 193 (A,B,C), 195 (A,B,C) and 198 (A,B,C) four stations were sampled in Ticonderoga Bay and 3 stations were sampled between Ticonderoga Bay and the Buoy 39 Marina on the Vermont shore. The additional stations in Ticonderoga Bay are identified as 3B, 3C, 3D, and 3F while those between the bay and Buoy 39 Marina are identified as 2A, 2B, 2C as indicated on Figure 1 in Appendix I. A total of 15 bottom samples and 36 dissolved oxygen samples were collected and analyzed together with Secchi Disk readings and temperature determinations at each station. A summary of survey results is attached to this report as Exhibit 3, Appendix I.

In addition to the surveys discussed above, the Water Resources Department conducted a general survey of the Vermont portion of Lake Champlain during the summers of 1957 and 1958. Over 300 stations were established and sampled during this period of which 22 are located between Chimney Point and Stony Point. The data collected in this survey is not extensive in nature and is not included in the following discussion on existing water quality.

PRESENT WATER QUALITY

Present water quality in the Vermont waters of Lake Champlain adjacent to Ticonderoga, New York as indicated by the 1965 and 1966 sampling data is discussed below. For purposes of this discussion the analyses performed on samples collected at the B and C quarter points at the lake sampling sections are taken to be indicative of water quality in the Vermont portion of the Lake.

The waters of Ticonderoga Bay itself are severely polluted by wastes entering from Ticonderoga Creek and from extensive organic sludge deposits on the floor of the bay. Dissolved oxygen in the bay area is severely depleted and is often absent as indicated by the attached data. Biochemical oxygen demand values as high as 205 milligrams/liter have been observed as well as coliform bacteria levels as high as 3,100,000 per 100 millimeters. The surface water of the bay is gray to black in appearance and often contains extensive floating sludge mats brought to the surface by severe gasification in the under-lying sludge deposits. The surface water is effervescent due to the constant emission of gas bubbles created by the anaerobic decay process in the under-lying septic sludge deposits. The escaping gas is extremely malodorous and has the characteristic "rotten egg" odor of hydrogen sulfide.

The waters of Lake Champlain adjacent to Ticonderoga Bay and in the State of Vermont are severely degraded by the pollution entering Ticonderoga Bay and the waters and floating sludge material which emanate from the bay.

Dissolved oxygen was severely depressed between Independence Point and Fort Ticonderoga (Stations 195; A,B,C) during the 1965 survey with D.O. concentrations generally below 2.0 mg/l and absent during one sampling run. Such levels are below the interstate standards limit for Class D water.* Dissolved oxygen levels at these stations were generally improved during the 1966 survey but were far below limits for Class B waters with concentrations ranging from 17% to only 57% of saturation.

Coliform bacteria levels off Independence Point were reported as high as 91,000 per 100 milliliters and were consistently in excess of the Class B coliform limit of 1,000.

Similar but slightly improved conditions were present at Stations 193; A,B,C, during the 1965-1966 surveys. Dissolved oxygen levels were generally less than 5.0 milligrams per liter and concentrations ranged from 29% to 63% of saturation. Coliform bacterial levels as high as 79,000/100 ml were reported and levels were consistently in excess of the Class B limit of 1,000.

The 1965-1966 survey data indicates that pollution present in Ticonderoga Bay may influence water quality as far as Chipmans Point which is approximately 2.5 miles south of the bay. Dissolved oxygen levels were below 75% saturation on four occasions and were below 80% on four other occasions. Bacteria levels were in excess of Class B limits on two samples.

Results from the September, 1968 biological survey by the Vermont Department of Water Resources confirm the existence of severely degraded water quality in Ticonderoga Bay and the adjacent Vermont waters. Dissolved oxygen levels were severely depressed and benthic organisms were limited to pollution tolerant organisms. No bottom dwelling organisms were found in Ticonderoga Bay and chironomid larvae (bloodworms) in large numbers were essentially the only organisms present on the lake floor in the adjacent Vermont waters.

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* See Exhibit 6, Appendix II - General Policy, Water Use Classes and Standards of Quality for Interstate Waters, State of Vermont, RR-PC-1.

PHYSICAL OBSERVATIONS AND EFFECTS OF POLLUTION

Vermont Department of Water Resources personnel have observed conditions in Ticonderoga Bay and the adjacent waters on several occasions over the past four years. In addition, shoreline residents have been interviewed during each of the past two summers by staff personnel. As a result of the above activities, the following effects from the pollution entering Ticonderoga Bay are evident.

The floor of Ticonderoga Bay, and to some extent the adjacent Vermont portion of the Lake, is blanketed by extensive sludge and wood chip deposits which are in a state of anaerobic (septic) decay as evidenced by the constant emission of gas bubbles from the water surface. The gas escaping from the surface is extremely malodorous and is evidently largely composed of hydrogen sulfide with its characteristic odor of rotten eggs.

The waters of the bay and the adjacent lake waters are extremely unappealing from an aesthetic viewpoint. The water is dark gray to black in color and often contains extensive sludge mats raised from the bottom by the severe gasification in the under-lying sludge deposits. An oily scum is generally visible on the surface as well.

Under the influence of a northwesterly wind, masses of floating sludge are often driven from the bay into the Buoy 39 Marina mooring on the Vermont shore of the lake. The resulting foul conditions in the marina have seriously affected the business there. Boat owners are reluctant to moor at the marina with the risk of fouling their boats and often refuse to remain overnight because of the nauseous odors emanating from the adjacent waters. The marina owners report a steady decline in business over the past several years.

The Industrial Hygiene Division of the Health Department has indicated by letter to the Water Resources Department that the emission of nauseous gasses from Ticonderoga Bay contribute to the air pollution problem in the area and that nearby residents would still be bothered even though emissions from the paper mill stack were fully controlled. (Exhibit 4, Appendix I).

Area residents report that fishing in the lake is poor as far north as the West Bridport area. When fish are caught they are inedible because of their poor taste which has been described as being similar to the odor from the paper mill.

The poor water quality in the Ticonderoga Bay area is further evidenced by the general absence of desirable benthic organisms as determined by a survey conducted by the Department's aquatic biologist in September, 1968. Benthic organisms between Chipman's Point and Larrabee's Point were generally confined to chironomid larvae (bloodworms). Bottom samples collected in Ticonderoga Bay itself were devoid of any benthic organisms.

Photographs taken by staff personnel during their various field inspections are attached to this report as Figures 3-11, Appendix II.

A copy of the results from interviewing shoreline residents during September 1968 is attached to this report as Exhibit 5, Appendix I.

APPENDIX I

EXHIBITS

Exhibit 1

LAKE CHAMPLAIN SURVEY - TICONDEROGA AREA - 1965

STATION	DATE	TIME	TEMP. °C	pH	D.O. mg/l	Cl mg/l	COLOR	TURBIDITY	B.O.D mg/l	COLIFORM per 100 ml
198	A 8/25/65	2:42P.M.	24.0	7.6	4.8	10.1	70	51	1.4	
	B 8/25/65	2:45P.M.	24.0	7.8	5.8	10.2	70	41	1.1	
	C 8/25/65	2:47P.M.	24.0	8.1	8.4	9.4	70	46	1.4	
	A 8/26/65	9:13A.M.	22.8	7.7	7.0	8.9	60	36	1.8	
	B 8/26/65	9:16A.M.	22.8	7.7	6.9	9.1	60	41	1.2	
	C 8/26/65	9:20A.M.	22.6	7.7	7.0	8.8	60	41	2.0	
	A 8/27/65	8:40A.M.	22.6	7.8	6.4	8.3	70	40	1.4	
	B 8/27/65	8:43A.M.	22.2	7.8	6.8	8.3	60	33	1.2	
	C 8/27/65	8:46A.M.	22.2	7.8	7.4	8.3	60	24	1.4	
195A	A 8/24/65	1:10P.M.	26.0	7.4	0.0	40.7	300	38	113	40,000
	B 8/24/65	1:13P.M.	25.0	7.5	0.1	12.9	300	9	47	20,000
	C 8/24/65	1:15P.M.	24.8	7.5	0.3	15.6	70	10	25	12,000
	D 8/24/65	1:18P.M.	25.0	7.5	0.5	12.8	70	9	26	12,000
	A 8/25/65	3:00P.M.	25.0	8.1	0.0	43.9	400	310	130	
	B 8/25/65	3:05P.M.	24.0	7.3	0.2	12.9	80	39	35	
	C 8/25/65	3:09P.M.	24.0	7.6	0.2	12.9	80	39	40	
	D 8/25/65	3:12P.M.	24.0	7.5	1.7	11.9	80	22	40	
	B 8/25/65	8:35A.M.	23.0	7.4	0.1	12.6	90	31	38	
	A 8/26/65	2:00P.M.	23.0	9.0	0.0	70.0	800	260	185	
	B 8/26/65	2:07P.M.	23.0	7.6	0.0	17.0	200	33	38	
	C 8/26/65	2:10P.M.	23.0	7.5	0.0	13.0	100	25	25	
	D 8/26/65	2:13P.M.	23.0	7.3	0.0	13.5	200	25	60	
	A 8/26/65	9:31A.M.	23.0	7.5	0.0	69.8	500	300	205	
	A 8/27/65	9:00A.M.	23.6	7.0	0.0	44.0	400	195	138	
	B 8/27/65	9:05A.M.	22.6	7.3	0.1	13.0	100	22	16	
	C 8/27/65	9:08A.M.	22.6	7.4	0.3	12.3	100	22	8	
	D 8/27/65	9:11A.M.	22.8	7.4	0.1	12.3	100	36	12	

LAKE CHAMPLAIN SURVEY - TICONDEROGA AREA - 1965 (con't)

STATION		DATE	TIME	TEMP. °C	pH	D.O. mg/1	Cl mg/1	COLOR	TURBIDITY	B.O.D. mg/1	COLIFORM per 100 ml
195	A	8/24/65	1:22P.M.	25.0	7.5	0.6	11.9	70	8	11	2900
	B	8/24/65	1:24P.M.	23.2	7.5	0.7	12.7	70	9	4.5	3800
	C	8/24/65	1:27P.M.	24.2	7.6	1.6	11.7	70	10	2.4	1700
	A	8/25/65	8:39A.M.	23.0	7.3	0.3	12.4	70	26	3.2	
	B	8/25/65	8:43A.M.	23.2	7.3	0.2	12.3	70	30	3.3	
	C	8/25/65	8:46A.M.	23.0	7.3	0.4	11.7	70	24	1.8	
	A	8/25/68	3:15P.M.	24.2	7.4	1.8	12.1	80	26	1.0	
	B	8/25/68	3:19P.M.	23.8	7.4	3.4	11.5	80	25	1.5	
	C	8/25/68	3:22P.M.	23.8	7.5	3.0	12.0	70	25	2.3	
	A	8/26/65	9:36A.M.	23.0	7.4	0.0	13.2	80	25	7.5	
	B	8/26/65	9:40A.M.	23.0	7.4	0.0	12.0	80	30	4.5	
	C	8/26/65	9:43A.M.	23.0	7.3	0.0	13.3	80	32	6.8	
193	A	8/24/65	1:34P.M.	24.0	7.8	4.9	11.5	70	11	2.2	1500
	B	8/24/65	1:36P.M.	24.0	7.6	5.3	11.3	70	12	1.4	220
	C	8/24/65	1:39P.M.	24.0	7.6	3.3	11.2	70	11	2.2	710
	A	8/25/65	8:52A.M.	23.0	7.3	1.1	12.1	70	31	3.8	
	B	8/25/65	8:55A.M.	23.0	7.4	3.9	10.5	70	26	1.4	
	C	8/25/65	8:57A.M.	23.0	7.5	2.2	12.0	70	29	1.8	
	A	8/26/65	9:49A.M.	23.0	7.3	1.9	11.8	80	41	4.3	
	B	8/26/65	9:52A.M.	23.0	7.4	3.2	11.8	80	41	0.7	
	C	8/26/65	9:54A.M.	23.0	7.2	3.7	10.9	80	36	1.2	
	A	8/26/65	2:20P.M.	23.5	7.3	0.2	12.8	200	26	4.1	
	B	8/26/65	2:22P.M.	23.0	7.4	2.5	11.5	100	30	1.4	
	C	8/26/65	2:25P.M.	23.0	7.4	3.6	11.0	100	40	1.1	
190	A	8/25/65	9:15A.M.	22.0	7.9	8.2	8.4	45	50	0.6	
	B	8/25/65	9:18A.M.	22.0	7.9	7.9	8.7	45	38	0.7	
	C	8/25/65	9:20A.M.	21.5	8.0	8.2	9.2	45	38	0.8	
	A	8/26/65	2:40P.M.	21.0	7.9	8.0	8.3	80	36	0.6	
	B	8/26/65	2:45P.M.	21.5	7.9	8.1	9.0	80	30	1.2	
	C	8/26/65	2:50P.M.	21.0	7.9	8.7	8.9	100	250	2.9	
	A	8/27/65	9:33A.M.	21.6	8.0	7.9	8.0	60	33	1.2	
	B	8/27/65	9:36A.M.	21.8	7.9	8.1	8.3	80	33	1.2	
	C	8/27/65	9:40A.M.	21.2	7.7	8.3	9.0	100	38	2.0	

Exhibit 2

HUDSON-CHAMPLAIN AND METROPOLITAN COASTAL COMPREHENSIVE PROJECT

Industrial Waste Survey

International Paper Company, Ticonderoga, N.Y.

1. Date of Meeting

August 5, 1966

2. Personnel Participating

INTERNATIONAL PAPER CO.

Mr. Robert M. Drummond, Director Water Management, Northern Division Office, Glen Falls, N.Y.

Dr. Grant K. Rauscher, Research Dept., Northern Division Office, Glen Falls, N.Y.

NEW YORK STATE DEPARTMENT OF HEALTH

Mr. Warren Slickenrieder, District Eng., Saranac Lake, N.Y.

Mr. Russel Mt. Pleasant, San. Engr., Albany, N.Y.

Mr. John LaPierre, San. Engr., Albany, N.Y.

FWPCA

Mr. Albert W. Bromberg, San. Engr., Metuchen, N.J.

3. Purpose

The meeting was arranged by the New York State Department of Health. The purpose of the meeting was to discuss the plant process operations and the resulting waste discharges as they relate to Ticonderoga Creek and Lake Champlain. A co-operative survey and sampling program is being planned by New York, Vermont and FWPCA to assess the effects of the plant discharges on the receiving waters.

GENERAL INFORMATION

4. Organization

The International Paper Company plant is located in the northern edge of Ticonderoga, N.Y., on Main St. This facility, which began operations in 1882, occupies 70-100 acres and employs approximately 1100 persons. It operates 24 hours a day, seven days a week, all year round. The company corporate office is located in New York City, with a northern division office in Glen Falls, N.Y.

5. Products

This plant has both pulp and paper making process operations. The major products are different types, grades and colors of finished paper. However, white finished stock is the predominent product. Orders are filled to consumer specifications; therefore any number of different types of paper may be under production at a given time. The plant produces approximately 50% of the pulp used in its paper making operation.

6. Raw Materials

Wood stock for pulp mill operation consisting of approximately one-third each of birch, maple and beech.

Wood chips from local saw mills.

Chemicals required for the Kraft (sulfate) process (sodium sulfate, caustic soda, chlorine, calcium hypochlorite, chlorine dioxide).

Pulp stock purchased from other pulp mills.

Ingredients for paper making process (clay filler, dyes, titanium, starch).

7. Capacity

The present plant capacity (1965) is 350-360 tons/day of unfinished paper stock, the major portion of which is white. The pulp mill furnishes approximately 50% of the pulp stock (200 tons/day,) the remainder purchased from other mills.

8. Operations

Operations at this plant consist of the pulping of wood and the manufacture of a final paper product.

The pulping operation employs the Kraft (sulfate) process. Primary raw material are wood logs obtained from New York and New England, and wood chips obtained from saw and lumber mills in the surrounding area. Process operations include debarking, chipping, chemical addition, digestion, cooking, blow tank operation to remove pulp, screening, draining, washing and bleaching. Cooking liquors are extracted for condensation and are incinerated for sodium salt recovery. The pulp is washed and bleached in successive stages with chlorine, calcium hypochlorite and chlorine dioxide, respectively.

The paper making process uses pulp produced at the site and imported pulp. The pulp is disintegrated and mixed, fillers, resins, colors and starch are added, and the resulting slurry passed to the paper making machines.

9. Water Supply

The plant water intake is located in Ticonderoga Creek, upstream of the village of Ticonderoga. At this point, the stream is supplied principally by Lake George and by Trout Brook, a tributary of Ticonderoga Creek. All water is treated by sand filtration supplemented by coagulation and chlorination during the summer months. The average daily water consumption (1965) is 15.0 MGD, with a range of 14-18 MGD.

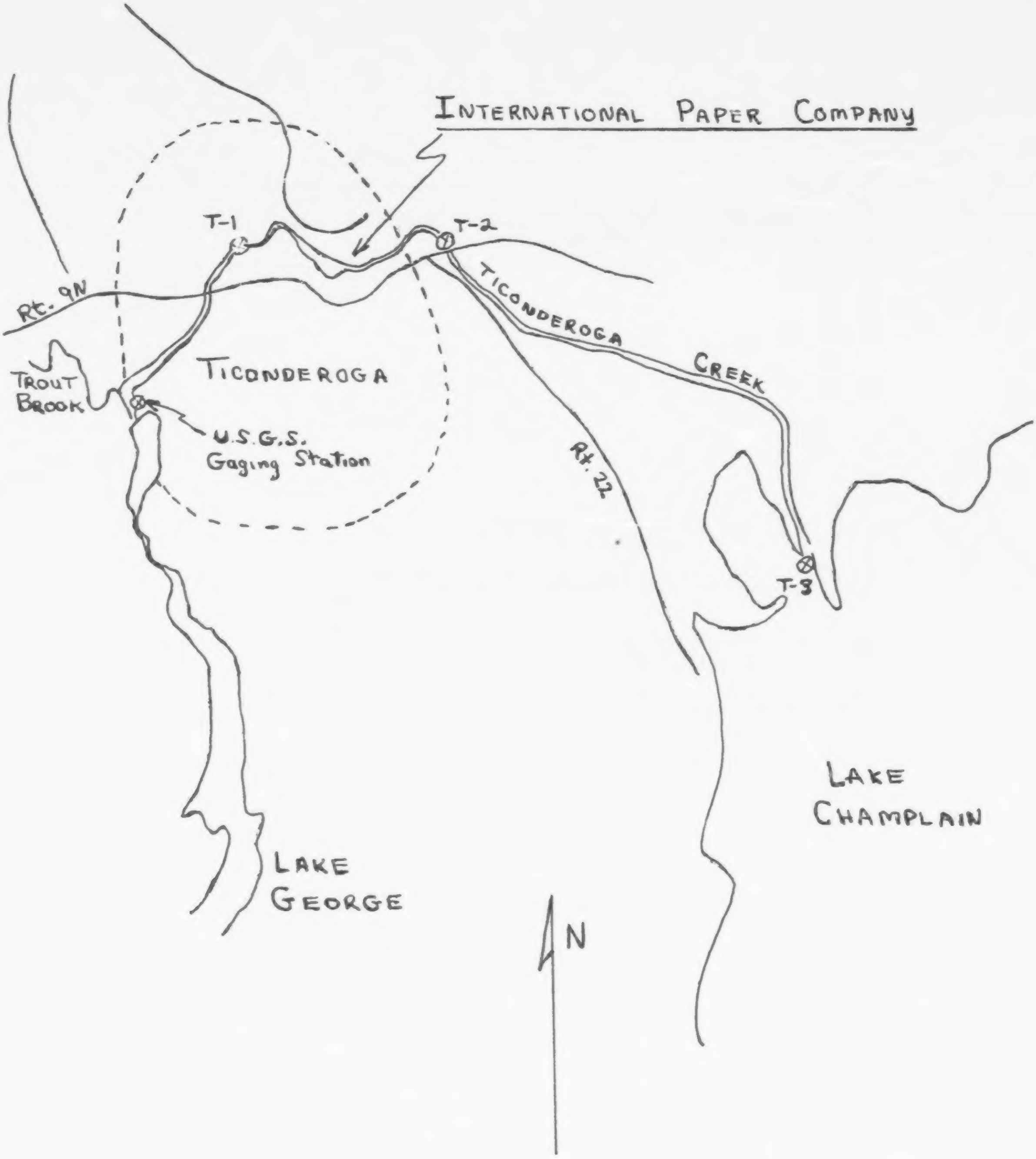
10. Waste Sources (see Fig. 1 and 2)

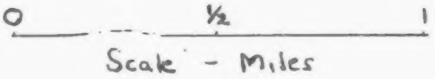
Paper Mill:

IP-1 - Paper Machine #4 Effluent.
IP-2 - Paper Machine #3 Effluent.
IP-3 - Paper Machine #7 Effluent.

Pulp Mill:

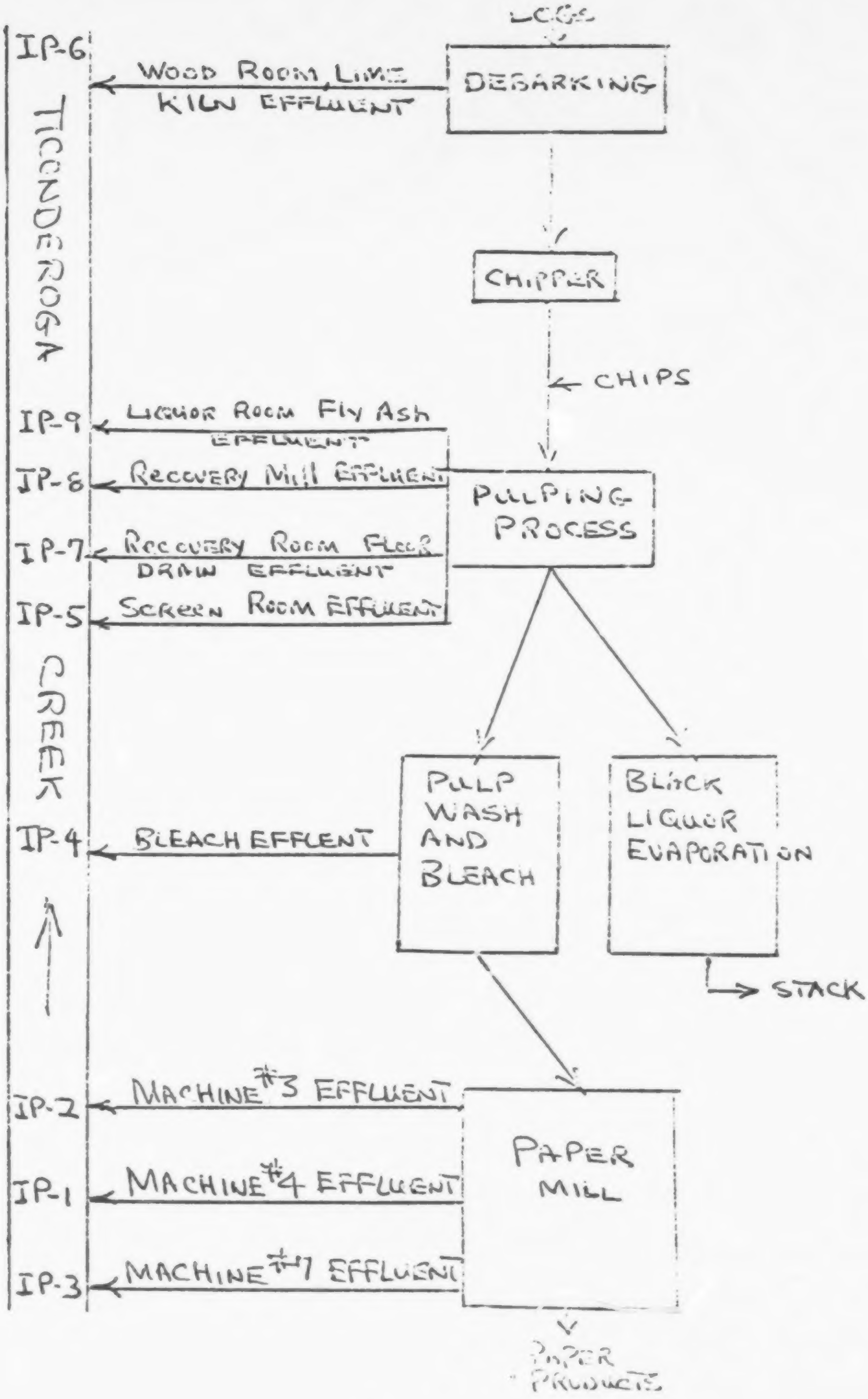
IP-4 - Bleach Effluent; Pulp wash and bleach waste, digestor stack gas scrubber waste.
IP-5 - Screen Room Effluent.


INTERNATIONAL PAPER COMPANY
T-1
T-2
Rt. 9N
TICONDEROGA
CREEK
TICONDEROGA
TROUT BROOK
U.S.G.S. Gaging Station
Rt. 22
T-8
LAKE CHAMPLAIN
LAKE GEORGE
N


0
½
1

Scale - Miles

FIGURE 2


LOGS
DEBARKING
IP-6
WOOD ROOM, LIME KILN EFFLUENT
TICONDEROGA
CHIPPER
CHIPS
IP-9
LIQUOR ROOM FLY ASH EFFLUENT
IP-8
RECOVERY MILL EFFLUENT
PULPING PROCESS
IP-7
RECOVERY ROOM FLOOR DRAIN EFFLUENT
IP-5
SCREEN ROOM EFFLUENT
CREEK
PULP WASH AND BLEACH
BLACK LIQUOR EVAPORATION
STACK
IP-4
BLEACH EFFLENT
IP-2
MACHINE #3 EFFLUENT
PAPER MILL
IP-1
MACHINE #4 EFFLUENT
IP-3
MACHINE #7 EFFLUENT
PAPER PRODUCTS

IP-6 - Wood Room (debarking) waste, (8 hr/day operation) plus rain drainage and municipal (Ticonderoga) sewage (quantity unknown).
IP-7 - Recovery room floor drain waste.
IP-8 - Recovery mill waste.
IP-9 - Liquor Room waste and fly ash pit waste.

Domestic waste from the plant is discharged in combination with the plant waste and directly to the stream. Plant officials did not know the quantity. FWPCA estimate: 1100 persons x 30 g/c/d/= 33,000 gpd.

All waste effluents discharge to Ticonderoga Creek, approximately 2 miles above its confluence with Lake Champlain (Figure 2). Studies conducted by International Paper Company indicated that the travel time from the point of discharge to Lake Champlain is approximately two (2) hours, at low flow periods.

11. Waste Treatment

All forms of waste load reduction at this plant are accomplished in terms of product recovery from the waste streams.

Pulp Mill:

Spent cooking (black) liquor is processed by evaporation and incineration. Sodium salts are recovered and subsequently reused in the make up of new cooking liquors.

Paper Mill:

Effluents from the three paper making machines are passed through vacuum save-alls and then floatation save-alls for the recovery of paper fibers and clay filler.

12. Analytical Data

The plant maintains a continuous surveillance of the paper mill waste for the loss of paper mill fibers and filler material. Fixed Suspended Solids are determined on a daily basis.

Since 1959, the plant has conducted plant effluent surveys of one month duration once each year in order to provide data for the New York State Department of Health. These reports are available at the Health Department and contain BOD, pH, SS (total and Fixed), DS and chlorides data. The latest data available are contained in an Engineers Report to the New York State Department of Health dated December 1, 1965.

13. Supplemental Information

Several major modifications have been made to this plant since its original construction. The first of these changes was in 1947 when the pulp mill was converted from the soda to the kraft process. More recent changes include the construction of a new paper mill (three paper machines at present with space for a fourth) and modernization of the pulp washing and bleaching facilities to reduce water use.

The village of Ticonderoga presently has no waste treatment facilities. A sewerage collection system is in place which discharges raw sewage to Ticonderoga Creek. The services of a consulting engineer have been retained to conduct a study for a treatment system, but his report is more than a year overdue. The paper mill was interested in this report to determine the feasibility of a joint treatment plant.

SAMPLING DATA

14. Sampling Survey of Plant Effluents and Receiving Waters

During the period August 15-18, 1966, an extensive sampling program of the plant waste effluents and the receiving waters was co-operatively undertaken by representatives of the New York State Department of Health, Vermont, and the Hudson-Champlain Project, FWPCA.

Utilizing automatic sampling equipment, plant effluents IP-1 through IP-5 were sampled for two consecutive 24-hour periods. (approx. 50 ml every 5 min.). In addition, IP-6, was sampled for an 8-hr. period on two separate days (1000 ml every hour), and IP-7 through IP-9 were sampled for one 8-hour period (2000 ml every two hours).

Stream samples were composited (1000 ml every hour) over an 8-hour period above (T-1) and below (T-2) the plant discharges on two separate days. On August 17, 1966, a four hour composite sample (2000 ml every hour) was collected at the mouth of Ticonderoga Creek in Lake Champlain (T-3).

Lake samples were collected by State of Vermont personnel at the 3 lateral quarter points for each of 7 cross sectional locations within the 22 mile stretch. In addition the mouth of Ticonderoga Creek was sampled at 4 lateral locations. All stations except 182 were sampled August 16, 17, and 18. Stations 193, 195, and 195A were also sampled August 15 and 19 while Station 182 was only sampled August 18. These sampling station locations are summarized below:

202 ABC	at Stony Point
198 ABC	at Chipman Point
195A-ABCD	mouth of Ticonderoga Creek
195 ABC	between Ft. Ticonderoga & Independence Pt.
193 ABC	at Ticonderoga Point
190 ABC	at Five Mile Point
183 ABC	at Putnam Creek near Crown Point
182 ABC	at Chimney Point

Note: locations ABC and D are positioned west to east.

15. Analytical Results from Plant Effluents and Ticonderoga Creek Samples

The analytical results for all samples collected are summarized by sample station on Tables I, II and IV. In addition, results of sampling and observations made by N.Y. State Dept. of Health are contained in Attachment I. All analyses were initiated within 12 hours after sample collection.

Analyses for Biochemical Oxygen Demand (BOD)on the samples collected August 16-17, 1966 were seeded with the influent of a municipal primary treatment plant. Analyses for BOD on the sample collected Aug. 17-18, 1966 were seeded with Lake Champlain water collected near the mouth of Ticonderoga Creek.

ATTACHMENT I

8 hour composite samples taken at Ticonderoga Creek on August 17, 1966, above and below International Paper Company. The dam is approximately 500' above the mill while the road bridge on Route 73 is about 1500' below. The samples were taken by Bill Stasiuk and Jack LaPierre.

Time	Location	D.O. mg/l	Temp. °C
10:00	Dam	8.4 probe	22.5
	"	8.4 winkler	"
10:30	Bridge	1.0 probe	25.0
11:00	Dam	8.0 winkler	23.5
11:30	Bridge	-	-
12:00	Dam	8.0 winkler	23.0
12:30	Bridge	-	-
1:00	-	-	-
1:30	Bridge	-	-
2:00	Dam	8.0 winkler	23.0
2:30	Bridge	-	-
3:00	Dam	7.8 winkler	23.5
3:30	Bridge	-	-
4:00	Dam	7.8 winkler	23.5
4:30	Bridge	-	-
5:00	Dam	7.9 probe	23.5
5:30	Bridge	0.4 probe	27.0
3:45	Bridge	6.8 probe	27.5

8 hour composite samples taken at Ticonderoga Creek by Bill Stasiuk and Jack LaPierre on August 17, 1966, above and below International Paper Company. Approximately, one quart samples were taken.

Location Dam 500' Above Mill	Bridge on Rt. 73 1500' Below Mill	Time Taken
X		10:00
	X	10:30
X		11:00
	X	11:30
X		12:00
	X	12:30
-		1:00
	X	1:30
X		2:00
	X	2:30
X		3:00
	X	3:30
X		4:00
	X	4:30
X		5:00
	X	5:30

8/16/66 - Boat run along Ticonderoga Creek starting at 2:10 p.m. from bridge along Route 73 about 1500' below International Paper Company Mill. Observations were made by Warren Schlickenrieder, Russ Mt. Pleasant, and George Hansen

2:15 p.m. Route 22 Bridge

Temp. 28°C
D.O. 5.6 mg/l

Extensive sludge deposits - Rising sludge
Gas bubbles - Cabbage odor
Grease marks on trees and banks

From bridge on Route 73 to bridge on Route 22

Sludge
Velocity about 1.5 ft./sec.
No aquatic growths present
Stream about 50' wide and about 2.5' deep
Velocity about 0.3 ft./sec.

Delaware & Hudson Railroad Bridge - 2:50 p.m.

Gasing, sludge deposits, cabbage odor
D.O. - 3.6 mg/l
Temp. - 28.5°C

1000' below RR Bridge (beginning of delta)
D.O. - 2.8 mg/l Temp. - 28.5°C

2000' below RR Bridge
D.O. - 2.5 mg/l Temp. 28.5°C

3:06 p.m. opposite Fort Ticonderoga

D.O. - 3.0 mg/l Temp. 28.5°C
Wood fibers in sludge, gasing, cabbage odors

3:12 p.m. on a line between Fort Defiance and Fort Ticonderoga
D.O. - 2.7 mg/l Temp. 28.5°C

Mouth of river - sludge, gasing, odor of cabbage
Delta - bogs of sludge

3:20 p.m. at extreme mouth
D.O. - 1.8 mg/l

Table IV

Lake Champlain Data 8/15 through 8/19/66

Station	Cross Section Point	Date	Weather	Time	Temp.	pH	DO	Total Solids	Fixed Solids	Cl	Color	Turb.	BOD	Coli.
202	A	8/16/66	Cloudy	9:50 AM	22	8.8	7.0	400	308	5.4	20	14	1.9	20
	B			9:55	22.5	8.4	7.1	408	352	5.3	30	15.5	3.0	20
	C			10:00	22.3	8.6	7.7	400	308	5.4	30	12	1.9	< 10
	A	8/17/66	Sunny	12:05 AM	22.8	7.0	7.4	408	316	5.4	30	18	0.5	200
	B			12:10	22.3	7.6	7.0	428	292	6.2	30	13	0.8	20
	C			12:15	22.5	8.0	7.0	404	300	5.5	30	12	1.0	50
	A	8/18/66	Sunny	10:20 AM	22.3	7.3	7.4	94	76	5.5	40	17	1.2	10
	B			10:25	22.3	8.3	7.0	95	77	5.7	30	20	0.9	10
	C			10:30	22.1	7.7	6.8	85	72	5.7	30	11	1.2	< 10
193	A	8/16/66	Cloudy	10:20 AM	22.5	8.4	6.0	452	372	6.5	40	19.5	1.9	80
	B			10:25	24.4	8.6	6.4	364	340	7.2	40	20	1.1	310
	C			10:30	22.3	8.4	8.4	452	364	6.6	50	20	1.6	110
	A	8/17/66	Sunny	11:35 AM	22.5	7.8	5.7	496	376	6.7	40	21	1.2	1,700
	B			11:40	22.0	7.6	6.1	392	320	6.4	40	23	0.7	1,400
	C			11:45	22.2	8.1	7.3	432	352	6.6	30	25	1.0	1,200
	A	8/18/66	Sunny	10:45 AM	22.8	7.9	6.6	97	74	6.6	40	22	1.0	160
	B			10:50	22.5	8.1	6.4	96	80	6.2	40	23	0.6	210
	C			10:55	22.3	8.1	7.3	93	83	6.4	40	25	1.0	70
195A	A	8/15/66	Overcast	2:00 PM	24.0	8.8	0.0	476	356	64.8	60	59	112	95,000
	B			2:10	23.0	8.5	0.8	392	252	28.0	60	57	37	25,000
	C			2:20	22.6	8.3	2.8	332	304	11.3	60	20	31	58,000
	D			2:30	22.6	8.2	2.5	400	380	12	50	18	72	67,000
	A	8/16/66	Cloudy	10:40 AM	23.1	6.9	0.7	436	304	27.2	> 70	37	154	590,000
	B			10:50	22.8	7.0	1.9	432	360	19.1	> 70	27	22	340,000
	C			10:55	22.5	8.3	2.9	344	284	10.4	50	15.5	3.5	20,000
	D			11:00	22.8	8.4	2.5	444	344	13.5	50	20	9	530,000

Table IV

Lake Champlain Data 8/15 through 8/19/66 (Cont'd)

Station	Cross Section Point	Date	Weather	Time	Temp.	pH	DO	Total Solids	Fixed Solids	Cl	Color	Turb.	BOD	Coli.
195A	A	8/17/66	Sunny	11:15 AM	25	7.2	0.4	504	344	55.0	40	49	84	3,100,000
	B			11:10	23	7.2	1.0	424	304	31.8	40	43	50	1,100,000
	C			11:00	22	7.2	3.1	384	296	10	50	21	3	80,000
	D			10:55	22	7.2	1.2	416	356	11.7	50	24	4	280,000
	A	8/18/66	Sunny	11:10 AM	24	8.8	0.0	127	113	7.0	50	26	23.5	20,000
	B			11:20	23.5	8.7	0.0	181	141	7.6	50	44	23.2	210,000
	C			11:25	22.9	7.4	2.2	76	66	10.2	40	13	1.0	10,000
	D			11:30	22.8	7.1	2.8	104	86	9.9	40	9.9	0.5	10,000
	A	8/19/66	Sunny	9:25 AM	23	6.9	0.0	612	536	28	> 70	45	36	1,000,000
	B			9:30	22.5	7.2	2.0	420	392	14.1	65	22.5	7.2	300,000
	C			9:35	22.1	7.0	2.2	424	332	11.4	50	14.5	0.8	30,000
	D			9:40	21.8	7.1	0	584	360	17.2	50	24	8.6	370,000
195	A	8/15/66	Overcast	2:40 PM	22.4	8.1	7.6	480	400	12.5	50	16	5.0	78,000
	B			2:50	22.8	8.3	1.4	424	380	13	60	15	5.8	91,000
	C			3:10	22.6	8.2	3.0	348	296	11.5	60	14	1.3	10,000
	A	8/16/66	Cloudy	11:05 AM	22.5	8.5	0.6	460	344	10.8	40	17	4.0	210,000
	B			11:15	21.4	8.2	2.5	312	248	9.4	40	14	1.6	>10
	C			11:20	22.1	8.3	3.9	352	288	10.2	50	14	2.0	45,000
	A	8/17/66	Sunny	10:35 AM	20.0	7.4	3.5	428	340	9.8	40	18	1.8	90,000
	B			10:45	21.0	7.1	4.0	448	340	9.6	40	14	1.2	25,000
	C			10:50	21.8	7.1	3.9	384	304	10.1	40	17	1.9	60,000
	A	8/18/66	Sunny	11:35 AM	23	7.0	3.1	92	74	10.4	40	9.5	1.2	10,000
	B			11:40	22.2	7.3	2.9	91	69	10.4	40	9	1.3	26,000
	C			11:45	22.1	7.2	2.3	78	65	9.4	40	8.5	.9	9,000

Table IV

Lake Champlain Data 8/15 through 8/19/66 (Cont'd)

Station	Cross Section Point	Date	Weather	Time	Temp.	pH	DO	Total Solids	Fixed Solids	Cl	Color	Turb.	BOD	Coli.
.195	A	8/19/66	Sunny	9:45 AM	21.8	7.4	2.7	404	328	10.8	59	17.5	2.55	100,000
	B			9:50	21.7	7.3	5.0	372	300	9.9	45	15	1.4	< 1,000
	C			9:55	22	7.5	4.6	348	296	8.8	45	14	1.3	< 1,000
193	A	8/15/66	Overcast	3:15 PM	22.6	8.5	2.2	344	276	11.5	50	17	2.5	29,000
	B			3:20	22.4	8.4	4.7	388	324	10	50	14	1.5	36,000
	C			3:25	22.8	6.7	4.6	328	368	10	60	12	1.5	1,400
	A	8/16/66	Cloudy	11:35 AM	22.3	8.2	3.4	440	404	9.9	60	16.5	2	160,000
	B			11:30	21.0	8.2	3.5	372	288	10.1	45	11	2.2	25,000
	C			11:40	22	8.6	4.6	308	256	9.6	40	12	1.5	2,600
	A	8/17/66	Sunny	10:15 AM	21.8	7.1	3.5	372	308	10.6	40	17	2.0	20,000
	B			10:20	21.5	7.1	4.0	376	292	10.3	40	12	2.0	51,000
	C			10:25	21.9	7.3	5.2	376	312	9.0	40	10	1.4	79,000
	A	8/18/66	Sunny	11:50 AM	22.7	7.3	4.8	83	65	9.3	40	12	1.9	4,000
	B			11:55	21.7	7.2	4.2	132	117	8.6	40	9.9	1.0	10,000
	C			12:00	23.2	7.4	5.3	85	63	9.6	40	9.1	1.8	300
	A	8/19/66	Sunny	10:00 AM	22.1	7.6	4.2	380	344	10.7	40	18.5	1.8	5,000
	B			10:05	21.5	7.3	5.6	372	308	8.8	40	12.5	0.9	< 100
	C			10:10	22.0	7.3	5.0	324	304	9.2	45	11.0	1.2	2,000
190	A	8/16/66	Cloudy	11:50 AM	21.9	8.6	7.8	260	260	3.2	40	17	1.8	30
	B			11:55	21.6	8.6	6.7	324	280	8.5	45	22	1.4	10
	C			12:00	21.8	8.8	9.0	420	372	8.9	40	42	1.4	300
	A	8/17/66	Sunny	9:45 AM	21	7.6	7.2	296	264	7.7	40	21	0.8	20
	B			9:50	21	8.2	7.4	308	288	8.5	40	25	0.9	210
	C			9:55	21.2	8.4	7.7	420	368	9.0	40	60	1.0	100

Table IV

Lake Champlain Data 8/15 through 8/19/66 (Cont'd)

Station	Cross Section Point	Date	Weather	Time	Temp.	pH	DO	Total Solids	Fixed Solids	Cl	Color	Turb.	BOD	Coli.
190	A	8/19/66	Sunny	12:10 PM	21.8	8.1	7.5	80	66	8.4	40	22	.9	26
	B			12:15	21.1	8.2	7.1	129	68	8.2	40	23	1.2	10
	C			12:20	22.1	8.3	7.4	87	82	8.5	40	31	1.2	40
183	A	8/16/66	Cloudy	12:15 PM	22.0	8.6	7.3	322	68	6.5	50	32	1.1	10
	B			12:20	19.3	8.6	7.1	316	256	6.4	40	26	1.2	20
	C			12:25	21.8	8.6	7.9	344	280	7.6	50	33	1.2	40
	A	8/17/66	Sunny	9:25 AM	21	7.9	7.6	380	328	6.8	40	29	0.9	60
	B			9:30	20	7.8	7.4	284	248	7.0	40	23	1.0	160
	C			9:35	20.5	7.9	7.8	392	368	6.8	40	27	1.0	40
	A	8/18/66	Sunny	12:35 PM	21.9	8.4	8.4	85	78	7.0	30	22	1.2	40
	B			12:40	19	8.1	7.4	71	66	7.0	40	24	.4	70
	C			12:45	20.5	8.1	7.7	68	65	7.6	40	24	1.5	50
182	A	8/18/66	Sunny	1:10 PM	23	8.3	8.7	57	47	-	30	13	1.1	30
	B			1:15	15.8	8.1	8.9	62	51	6.6	30	17	1.4	70
	C			1:20	20.9	8.5	8.9	65	56	-	30	22	1.3	230

Table -

Sample Station	Analyses	Flow (MGD)	BOD (mg/l)[1]	BOD (mg/l)	BOD (mg/l)[2]	COD (mg/l)	Total Solids (mg/l)	Total Fixed Solids (mg/l)	Total Suspended Solids (mg/l)	Total Fixed Sus. Solids (mg/l)	Settleable Solids (mg/l)	pH	Alkalinity (mg/l)	Acidity (mg/l)	Chlorides (mg/l)	Sulfate (mg/l)	Sulfite (mg/l)	Sulfide (mg/l)	Hardness (mg/l)	Conductivity (µmhos/cm)	Temperature (°C)	Color
T-1	Grab Sample 8/16/66											7.9	39							50		Clear
	8-hr. Composite 8/16/66		9.7 25%	8.3 50%	7.6 100%	24	108	80	42	nil	nil	7.2	32	—	6	16	0	0.49	75			"
	8-hr. Composite 8/17/66		9.8 25%	5.9 50%	4.0 100%	24	114	110	13	nil	nil	7.4	50	—	7	21	0.2	0.15	67			"
T-2	Grab Sample 8/16/66											6.7	50	9						50		Brown Turbid
	8-hr. Composite 8/16/66		94 1%	113 5%	dep. 10%	420	725	344	281	79	134	6.9	37	—	79	—	2.0	0.92	82			"
	8-hr. Composite 8/17/66		170 1%	98 5%	dep. 10%	400	526	350	289	123	210	9.2	109	—	57	41	1.8	0.44	71			"
T-3	4-hr. Composite 8/17/66		420 .25%	152 1%	80 5%	128	342	297	48	18	—	7.0	111	—	47	41	2.2	1.47	—			"
IP-1	Grab Sample 8/16/66											6.6	15	14						250	32.1	White Turbid
	24-hr. Composite 8/16-17/66	1.49	low 25%	197 .5%	dep. 1%	753	982	419	248	62	117	6.6	14	—	16	49	nil	0.05				"
	24-hr. Composite 8/17-18/66	1.49	612 .25%	126 1%	96 5%	224	592	335	304	160	197	6.7	14	—	10	66	nil	0.48				"
IP-2	Grab Sample 8/16/66											4.6	5	33						400	31.8	"
	24-hr. Composite 8/16-17/66	2.48	low .35%	106 1%	93 5%	306	859	534	225	119	123	4.7	—	22	15	—	nil	0.09	—			"
	24-hr. Composite 8/17-18/66	2.48	low 25%	146 1%	115 5%	243	646	429	416	267	354	6.4	8	—	12	94	nil	1.86	—			"
IP-3	Grab Sample 8/16/66											6.4	28	10						200	30.0	"
	24-hr. Composite 8/16-17/66	3.00	low .25%	144 1%	104 5%	396	536	187	88	11	6	7.0	19	—	11	45	nil	0.17	—			"
	24-hr. Composite 8/17-18/66	3.00	low 25%	204 1%	137 5%	336	588	281	230	84	144	7.0	26	—	11	71	nil	0.19	—			"

Table II

Sample Station	Analyses	Flow (MGD)	BOD (mg/l)[1]	BOD (mg/l)	BOD (mg/l)[2]	COD (mg/l)	Total Solids (mg/l)	Total Fixed Solids (mg/l)	Total Suspended Solids (mg/l)	Total Fixed Sus. Solids (mg/l)	Settleable Solids (mg/l)	pH	Alkalinity (mg/l)	Acidity (mg/l)	Chlorides (mg/l)	Sulfate (mg/l)	Sulfite (mg/l)	Sulfide (mg/l)	Hardness (mg/l)	Conductivity (µmhos/cm)	Temperature (°C)	Color
TP 11	Grab Sample 8/16/66											2.8	—	199						2500	38.1	Yellow-Brown Turbid
	24-hr. Composite 8/16-17/66	4.76	low .25%	140 1%	dep. 5%	676	1344	850	111	8	25	2.9	—	187	484	90	3.7	1.3				"
	24-hr. Composite 8/17-18/66	4.76	408 .25%	285 1%	dep. 5%	671	1102	750	169	15	129	3.1	-	129	405	86	44	0.72				"
IP-5	Grab Sample 8/16/66											9.2	124	-						400	32.1	Dark Brown Turbid
	24-hr. Composite 8/16-17/66	1.94	low 1%	low 25% 234 5%	269 1%	1500	1287	306	809	12	758	9.4	118	—	7	18	1.6	2.0				"
	24-hr. Composite 8/17-18/66	1.94	1190 1%	656 25% 478 .5%	422 1%	1986	774	433	60	nil	18	9.4	196	—	13	32	5.1	11.7				"
IP-6	Grab Sample 8/16/66											8.7	>1600	—						250	25.1	Brown-Grey Turbid
	8-hr. Composite 8/16/66	0.46	low .25%	136 1%	120 5%	939	1447	773	268	93	72	7.2	72	—	9	35	2.1	1.4				"
	8-hr. Composite 8/17/66	0.38	456 .25%	186 1%	102 5%	425	1243	881	615	431	448	9.1	246	—	23							
IP-7	Grab Sample 8/16/66											10.1	178	—						600	37.0	Brown Clear
	8-hr. Composite 8/16/66	0.40	low .25%	low 1%	75 5%	196	413	245	44	nil	nil	10.1	133	—	25	37	10.8	2.4				"
IP 8	[illegible] Sample [illegible] / 66											10.6	680	-						2600	36.3	Dark Brown Turbid
	[illegible]posite [illegible] / 66	0.08	low .1%	306 .5%	dep. 5%	2100	1784	1240	43	nil	3	10.7	536	—	38	50	274	5.9				"
IP-9	Grab Sample 8/16/66											10.2	109	—						300	24.4	Grey-Black Turbid
	8hr. Composite 8/16/66	1.05	low 1%	low 5%	46 10%	1942	—	-	—	—	—	10.2	127	-	13	-	-	0.9				"

1 - low - insufficient DO depletion to consider result valid.

2 - dep. - complete DO depletion, no results.

ROUTING
GENERAL
TO NOTED DATE
SUSPEND TO
FILE

DEPARTMENT OF WATER RESOURCES
MONTPELIER, VERMONT

Exhibit 3

OFFICE MEMORANDUM

TO: David Clough

FROM: James Morse

SUBJECT: Ticonderoga Area

DATE: October 1, 1968

On September 17, 18, 25, and 26 the author visited the Ticonderoga area. The following conditions were found between Chipmans and Larrabees Points.

Station	Secchi Disc (inches)	Depth (meters)	DO(PPM)	Temp.C°	Bottom Type	Bottom Organisms
193 A	29	S	3.4	22.1	Too hard to dredge	
		1M	2.5	22.1		
193 B	29	S	1.8	23.0	clay	20 chironomid
		1M		22.5		
		2M	2.1	22.2		
		3M		22.0		
		4M	2.1	22.0		
		5M		21.7		
		5.5M		21.2		
193 C	36	S	2.1	23.0	muck & wood chips	> 30 chironomids
195 A	24	S	0.2	23.0	muck & wood chips	> 30 chironomids
		1		22.4		
		2	0.1	22.0		
195 B	20	S	1.4	23.0	muck & wood chips	> 30 chironomids
		1	0.9	22.5		
		2		22.0		
		3	0.7	22.0		
		4		21.3		
		5	0.4	21.1		
195 C	36	S	1.7	22.1	clay & muck	few chironomids and two fresh water clams
		1	0.5	21.9		
3 F	22	S	0.5	24.5	muck	none
3 C	12	S	0.1	25.5	muck & wood chips	none

Station	Secchi Disc (inches)	Depth (meters)	DO(PPM)	Temp.C°	Bottom Type	Bottom Organisms
3 D	6	S	0.0	26.5	muck & wood chips	none
3 B	13	S	2.4	22.0	muck	none
2 A	18	S	5.3	21.2	clay	none
		1	3.1	20.5		
2 B		S	6.3	22.0	clay	7 chironomids
		1	6.1	20.7		
		2		20.3		
		3	2.8	20.2		
		4		20.2		
		5	1.7	20.1		
		6		20.0		
		6.5	1.1	20.0		
2 C	23	S	6.4	24.0	clay	>20 chironomids 2 types of fres water snails
		1	5.7	20.0		
198 A	26	S	2.9	21.8	clay	>20 chironomids
		1		21.5		
		2		21.5		
		3	2.3	21.5		
		4	2.4	21.5		
		5		21.5		
198 B	26	S	3.7	21.9	clay	> 20 chironmids 1 leach many chadoorus larvae
		1		21.9		
		2		21.9		
		3	4.5	21.5		
		4		21.3		
		5	2.1	21.3		
198 C	13 (steady stream of clay particles flowing in a visible stream up-lake)	S	5.4	22.2	clay	few chironomids
		1		22.2		
		2	5.4	22.0		
		3	5.4	22.0		

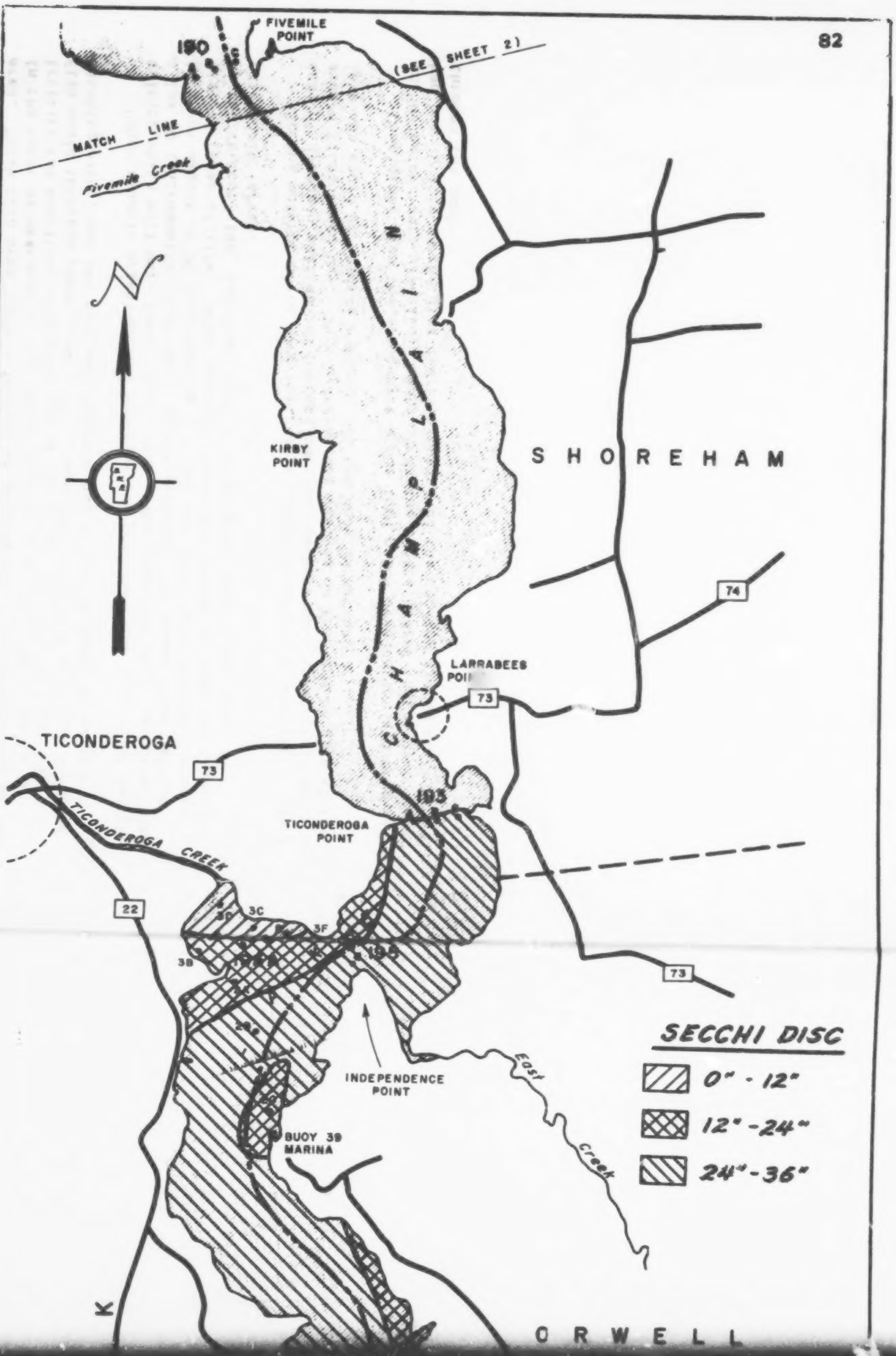
None of the areas sampled were advantageous to most any type of life one might wish to consider with the possible exception of bloodworms(chironomid larvae).

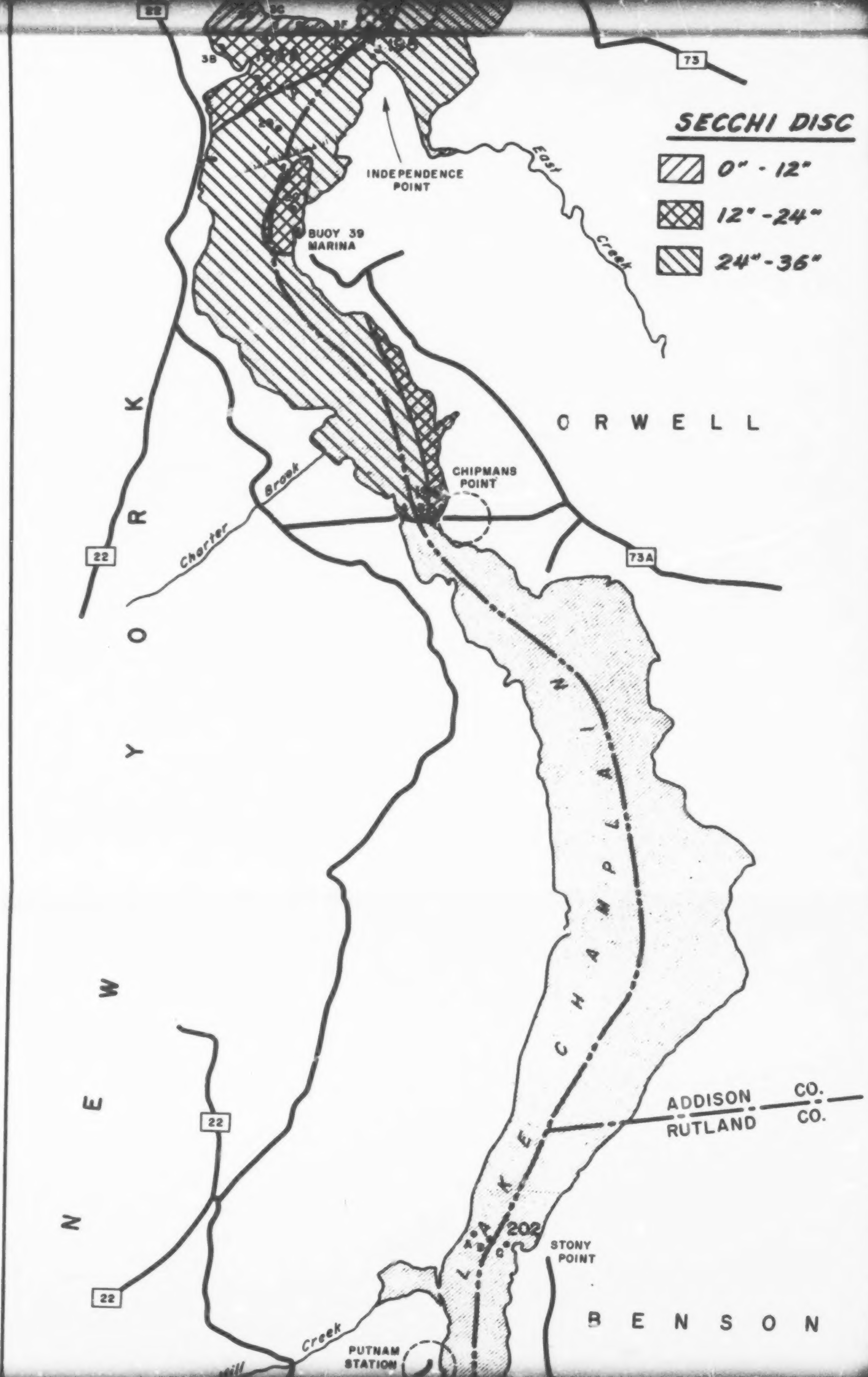
The dissolved oxygen is considered to be very low throughout the entire area. Trash fish were visible feeding or gulping air. The particulate matter in the water as measured by the secchi disc is considered dense enough to irritate the sensitive membranes lining the gills, and only the most hardy fish could tolerate these conditions. Land owners in this area have reported catching perch, but the meat was inedible due to a vile taste of sulphur.

Other aquatic organisms are beset by two problems; the lack of DO and the silting which will bury them. Again only there organisms which can exist with a low DO (chironomids) find there waters suitable. Chipmaas Point had the greatest amount of DO (approaching 6.0 ppm) and here there existed the most diverse types of life. Here, however, a visible stream of clay was flowing up the Vermont side, and thus, this silting again limited the life to chironomid larvae.

Strong sulphur odors were noticeable within this entire area and a great deal of hydrogen sulfide and perhaps odorless methane were apparent in and around Ticonderoga Bay. This bubbling was visible on the Vermont side of the lake and could be readily observed off the Buoy 39 Marina.

Complaints from the landowners about land price devaluation and drop-off in businesses were plentiful. Buoy 39 Marina owners stated that many outboards had been ruined in the area due to clogging of the cooling system while traveling through the muck.


190
FIVEMILE POINT
(SEE SHEET 2)
MATCH LINE
Fivemile Creek
CHAMPLAIN
KIRBY POINT
SHOREHAM
74
LARRABEES POINT
73
TICONDEROGA
73
195
TICONDEROGA CREEK
TICONDEROGA POINT
22
3C
3D
3F
3B
195
73
2B
INDEPENDENCE POINT
BUOY 39 MARINA
East Creek
SECCHI DISC
▨ 0" - 12"
▦ 12" - 24"
▧ 24" - 36"
K
ORWELL

88
3C
3F
3B
73
SECCHI DISC
0" - 12"
12" - 24"
24" - 36"
INDEPENDENCE POINT
East Creek
BUOY 39 MARINA
ORWELL
CHIPMANS POINT
Charter Brook
22
73A
NEW YORK
LAKE CHAMPLAIN
ADDISON CO.
RUTLAND CO.
22
202
A
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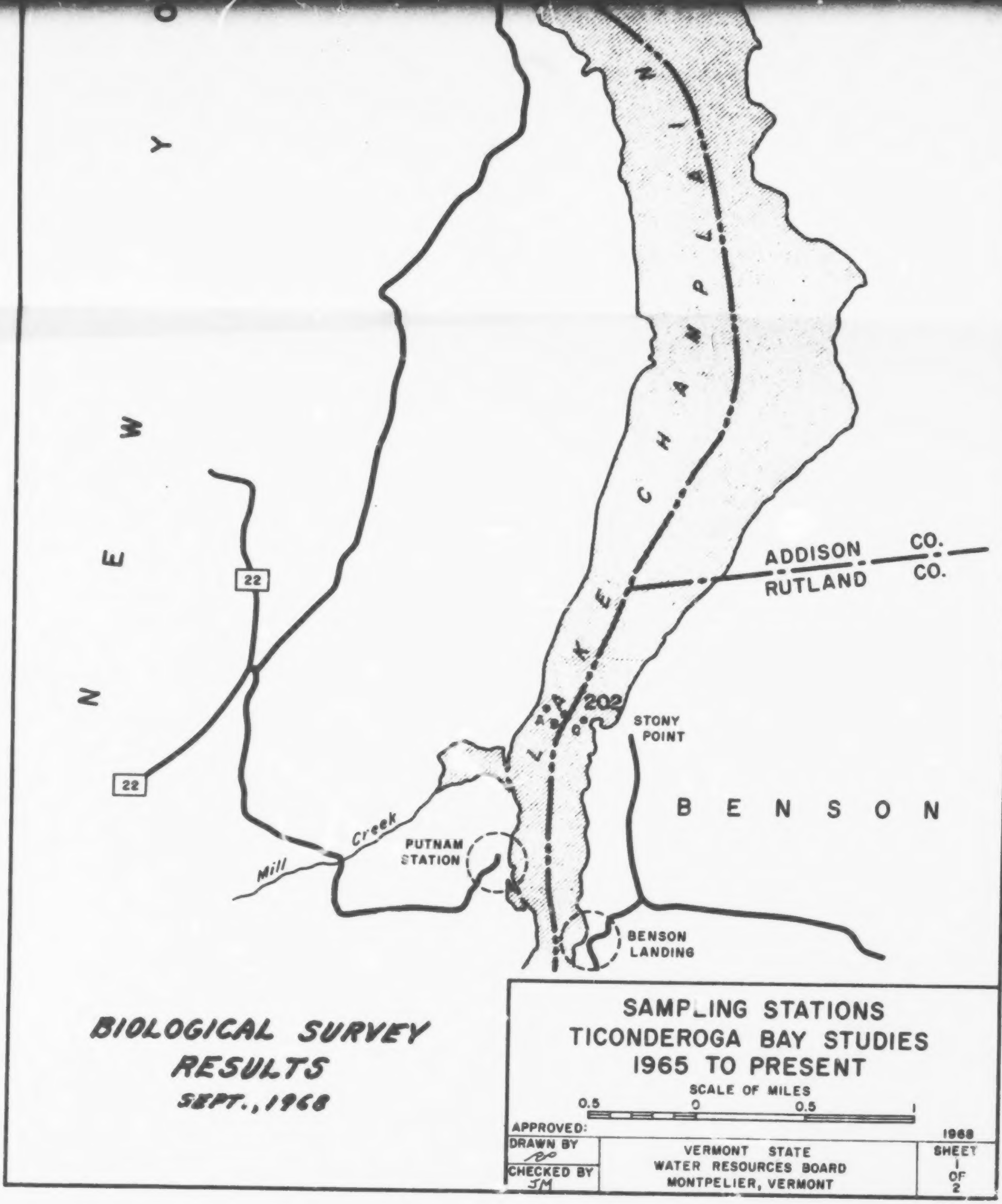
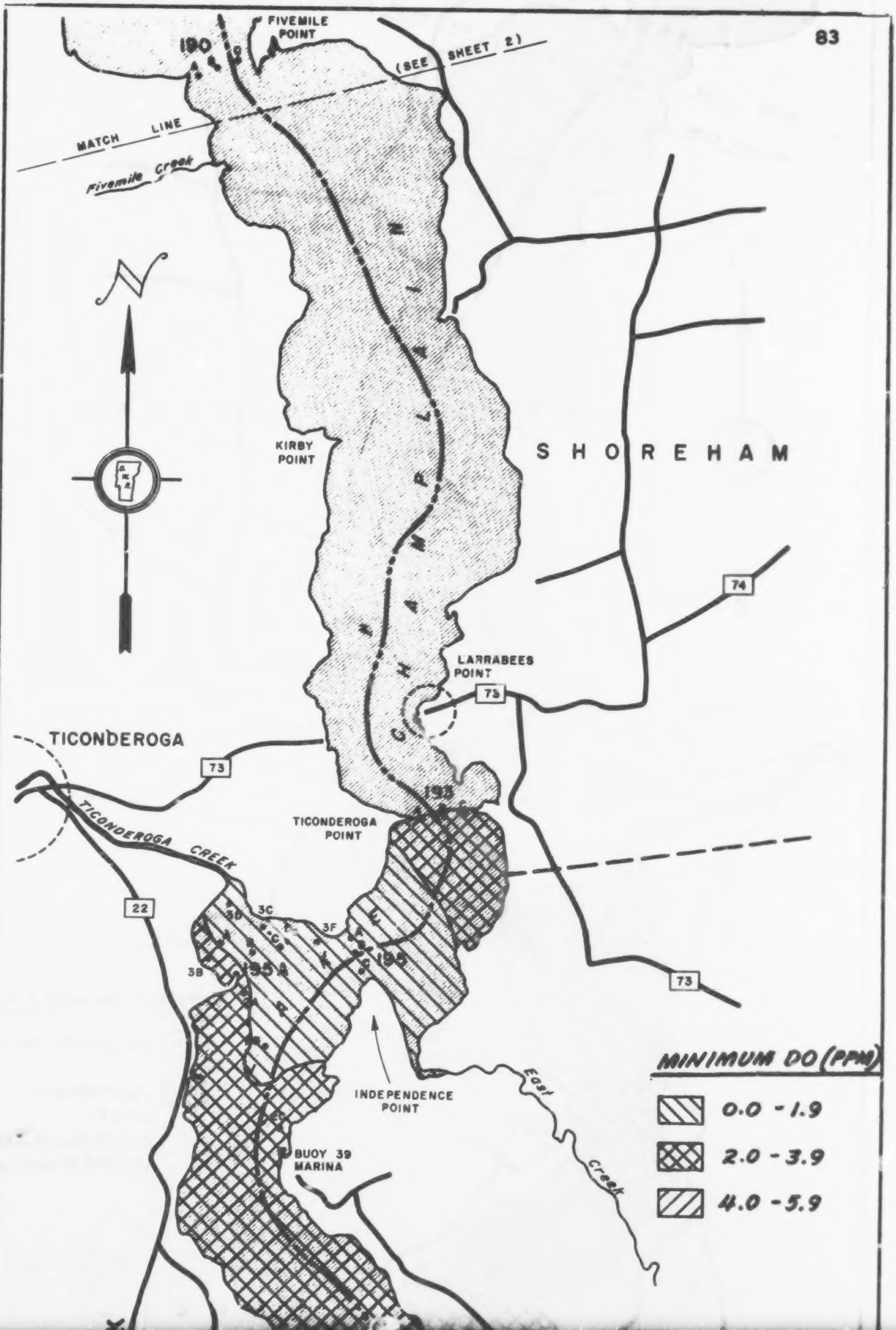
C
STONY POINT
22
BENSON
Creek
PUTNAM STATION


N E W Y O
LAKE CHAMPLAIN
ADDISON CO.
RUTLAND CO.
22
22
Mill Creek
PUTNAM STATION
202
A
B
C
STONY POINT
BENSON
BENSON LANDING
SCALE OF MILES
0.5
0
0.5
1

BIOLOGICAL SURVEY RESULTS
SEPT., 1968

SAMPLING STATIONS
TICONDEROGA BAY STUDIES
1965 TO PRESENT

APPROVED:
1968
DRAWN BY
CHECKED BY
JM
VERMONT STATE
WATER RESOURCES BOARD
MONTPELIER, VERMONT
SHEET
1
OF
2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(SEE SHEET 2)
MATCH LINE
Fivemile Creek
CHAMPLAIN
KIRBY POINT
SHOREHAM
74
LARRABEES POINT
73
TICONDEROGA
73
TICONDEROGA CREEK
193
TICONDEROGA POINT
22
3D
3C
3F
3B
195A
195
73
INDEPENDENCE POINT
East Creek
BUOY 39 MARINA
MINIMUM DO (PPM)
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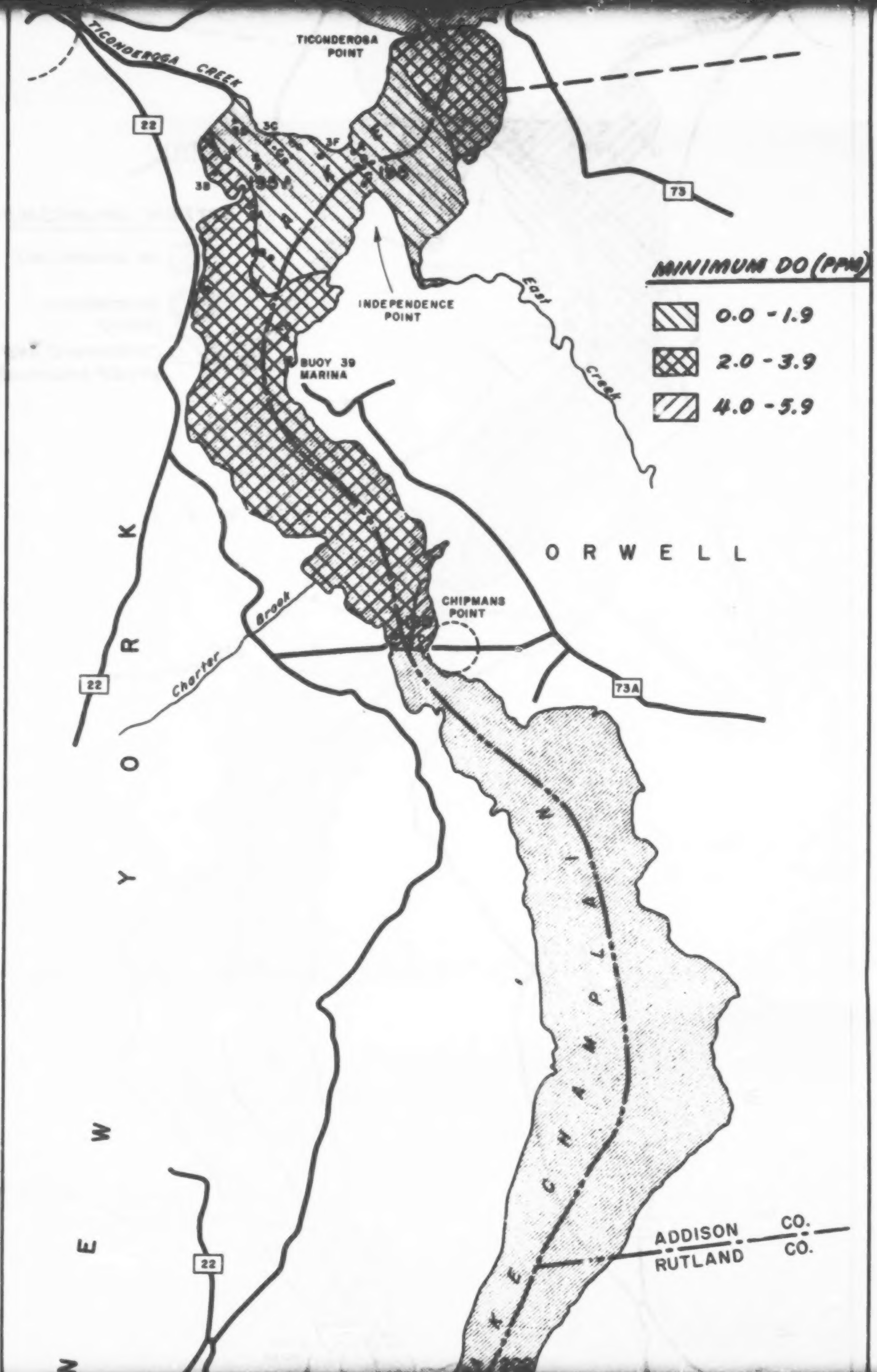
2.0 - 3.9
4.0 - 5.9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MINIMUM DO (PPM)
0.0 - 1.9
2.0 - 3.9
4.0 - 5.9
INDEPENDENCE POINT
East Creek
BUOY 39 MARINA
ORWELL
CHIPMANS POINT
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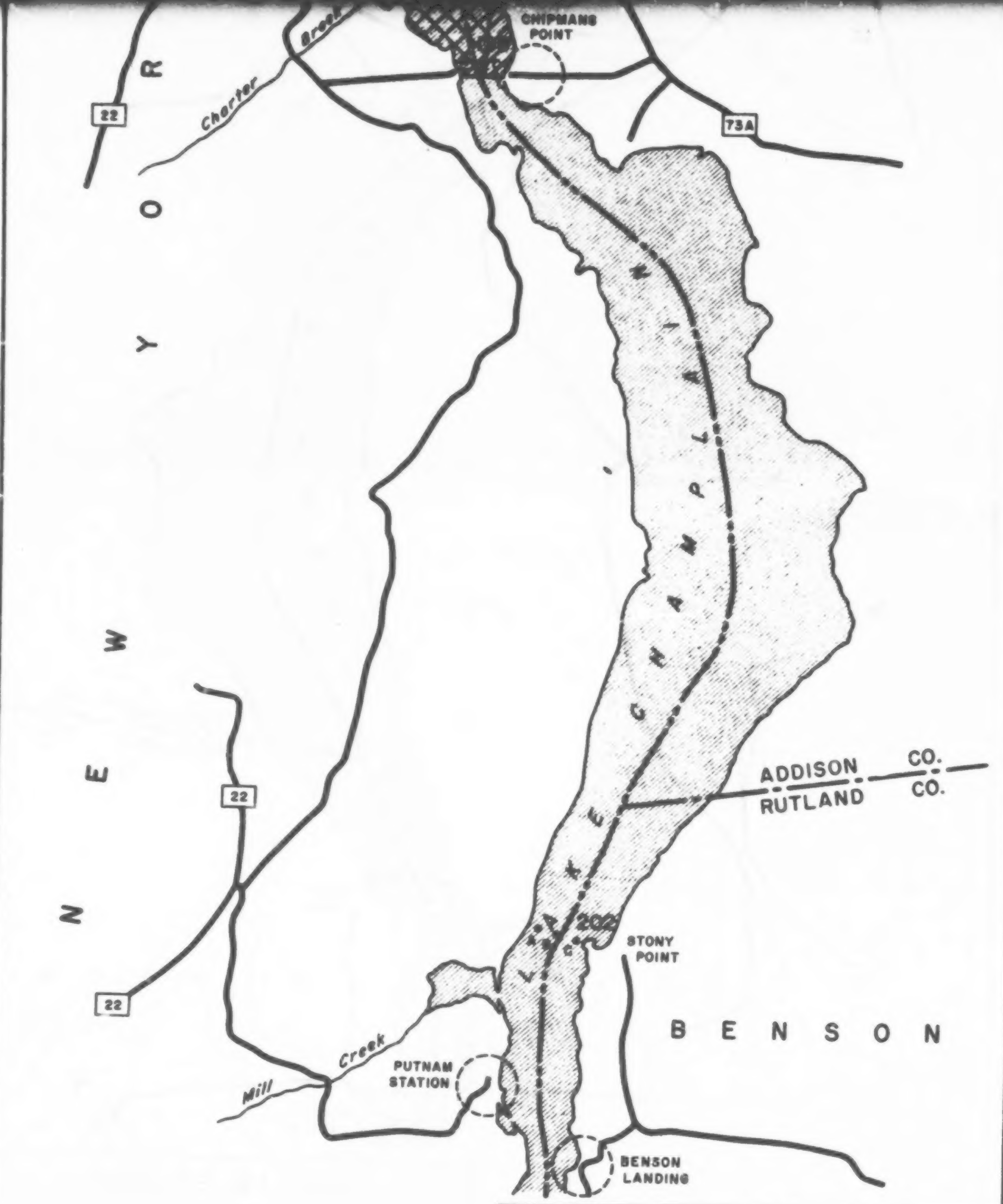
NEW YORK
LAKE CHAMPLAIN
22
ADDISON CO.
RUTLAND CO.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Charter Brook
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LAKE CHAMPLAIN
ADDISON CO.
RUTLAND CO.
202
STONY POINT
22
22
BENSON
Mill Creek
PUTNAM STATION
BENSON LANDING

BIOLOGICAL SURVEY RESULTS
SEPT., 1968

SAMPLING STATIONS
TICONDEROGA BAY STUDIES
1965 TO PRESENT

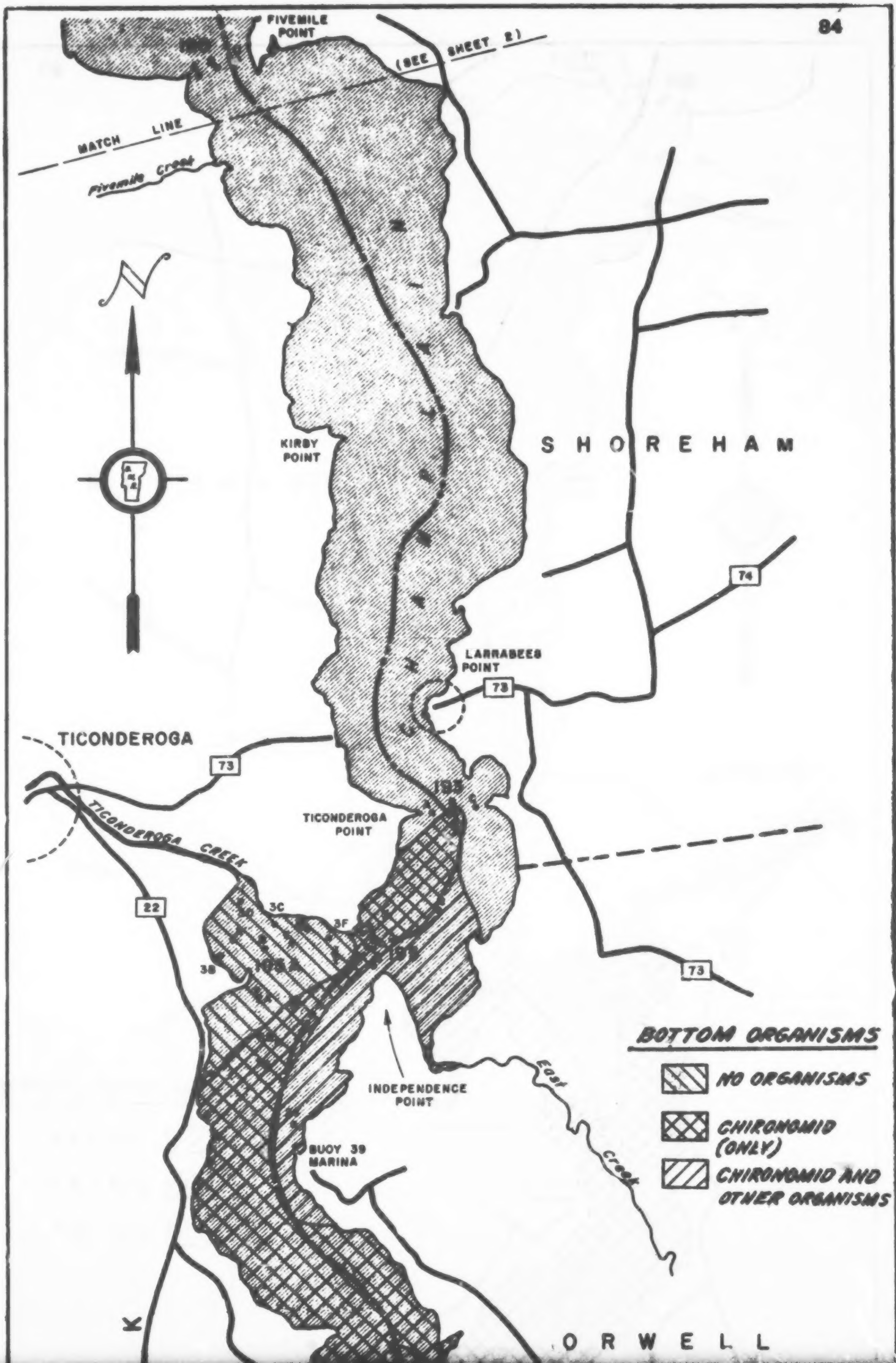
SCALE OF MILES
0.5 0 0.5 1

APPROVED:
1968

DRAWN BY
CHECKED BY JM

VERMONT STATE
WATER RESOURCES BOARD
MONTPELIER, VERMONT

SHEET 1 OF 2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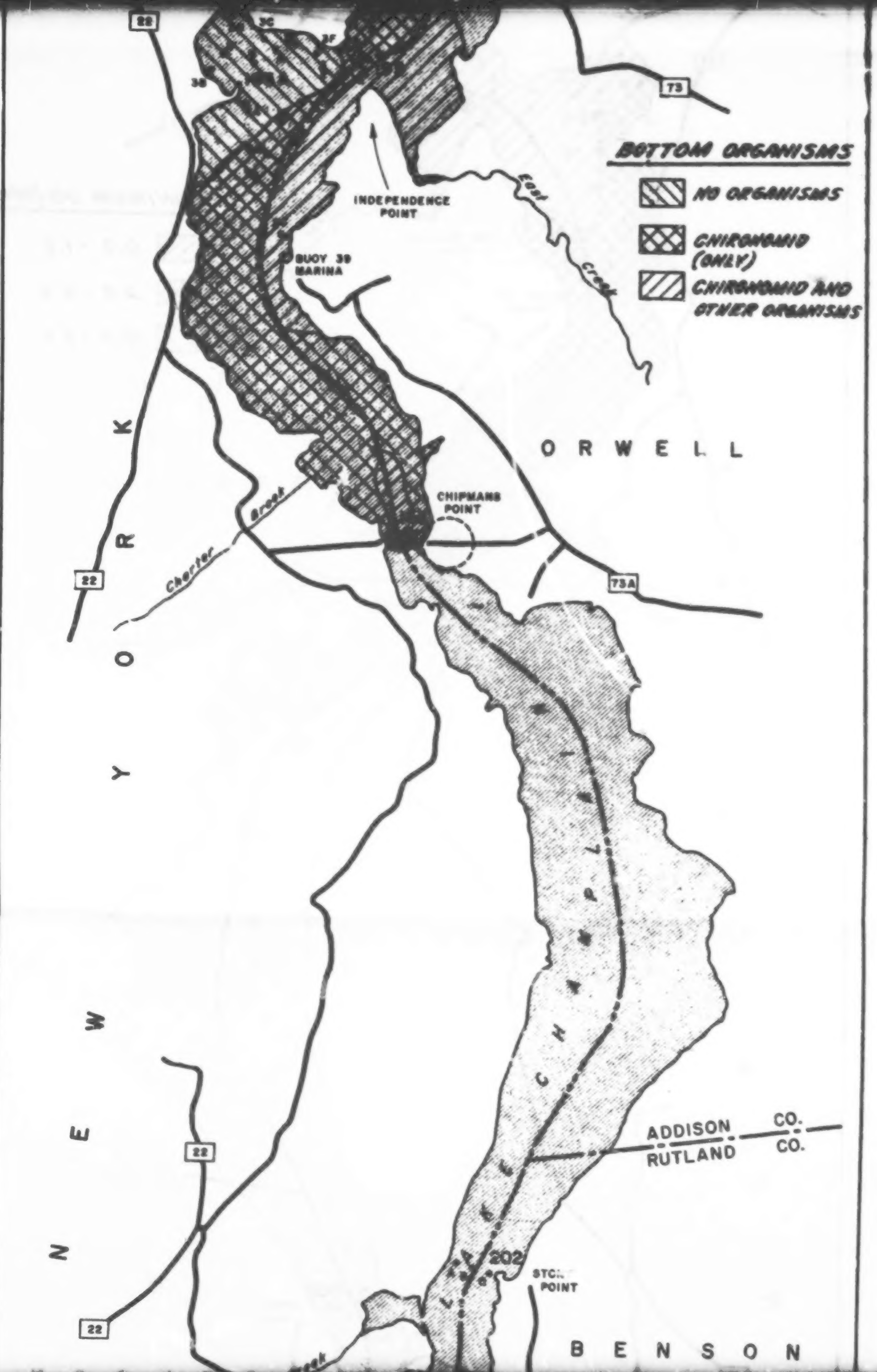
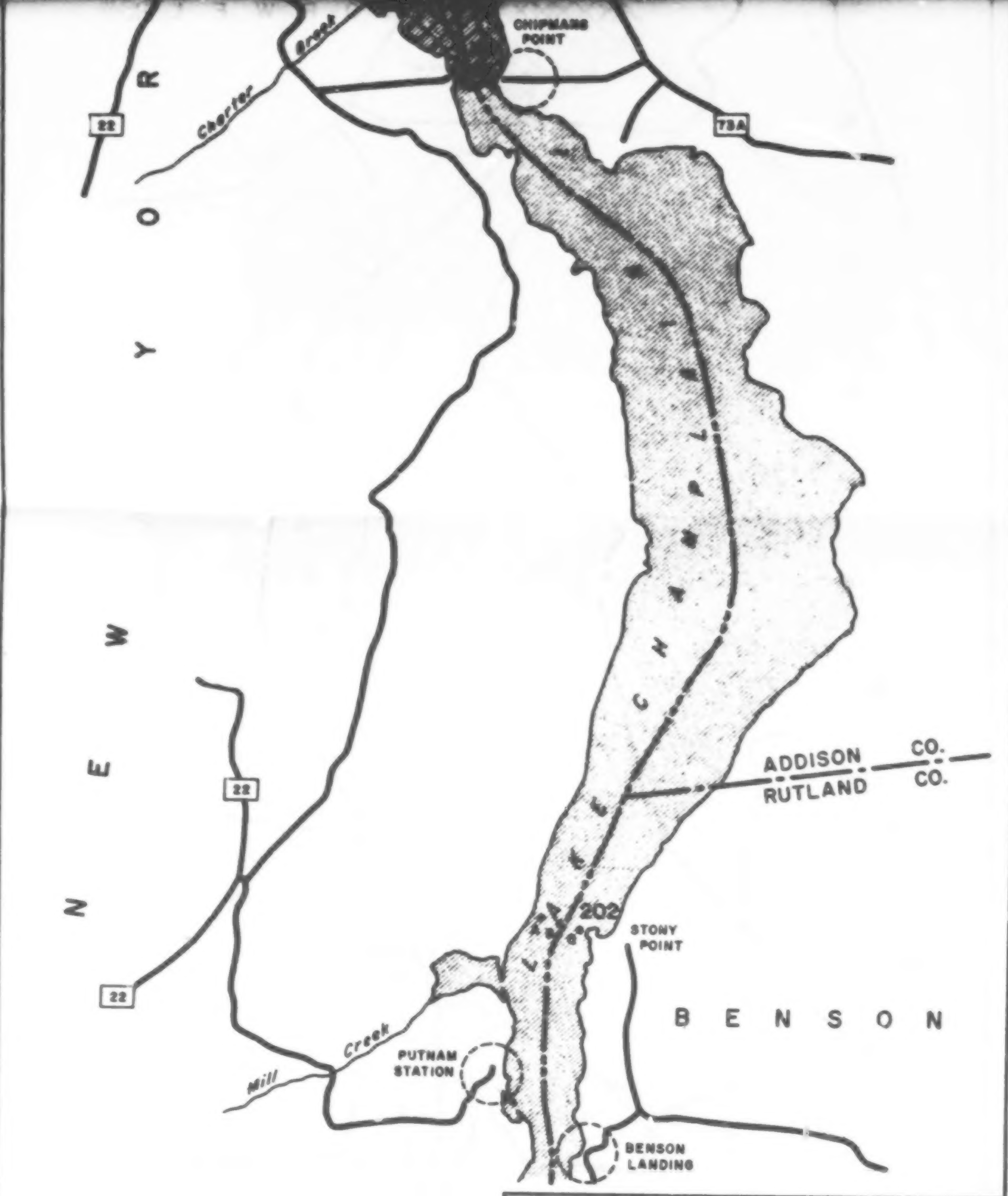
(SEE SHEET 2)
MATCH LINE
Fivemile Creek
KIRBY POINT
SHOREHAM
74
LARRABEES POINT
73
TICONDEROGA
73
193
TICONDEROGA POINT
TICONDEROGA CREEK
22
3C
3F
3B
73
INDEPENDENCE POINT
BUOY 39 MARINA
East Creek
BOTTOM ORGANISMS
NO ORGANISMS
CHIRONOMID (ONLY)
CHIRONOMID AND OTHER ORGANISMS
ORWELL


BOTTOM ORGANISMS
▨ NO ORGANISMS
▦ CHIRONOMID (ONLY)
▨ CHIRONOMID AND OTHER ORGANISMS
22
3C
3F
3B
73
INDEPENDENCE POINT
East Creek
BUOY 39 MARINA
NEW YORK
ORWELL
CHIPMANS POINT
Charter Brook
73A
LAKE CHAMPLAIN
ADDISON CO.
RUTLAND CO.
202
STONY POINT
BENSON
Creek


CHIPMANS POINT
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ADDISON CO.
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STONY POINT
BENSON
22
22
Mill Creek
PUTNAM STATION
BENSON LANDING

BIOLOGICAL SURVEY RESULTS
SEPT., 1968

SAMPLING STATIONS
TICONDEROGA BAY STUDIES
1965 TO PRESENT

SCALE OF MILES
0.5 0 0.5 1

APPROVED:		1968
DRAWN BY	VERMONT STATE WATER RESOURCES BOARD MONTPELIER, VERMONT	SHEET 1 OF 2
CHECKED BY JM		

Exhibit 4

ROBERT B. AIKEN, M. D. M. P. H.
COMMISSIONER

STATE OF VERMONT
DEPARTMENT OF HEALTH

DIVISION OF INDUSTRIAL HYGIENE
32 SPAULDING ST.
BARRE, VERMONT

IN REPLY PLEASE ADDRESS
P. O. BOX 607
BARRE, VERMONT 05641
TEL. 802 476-4071

July 26, 1966

Mr. A. William Albert, Director
Pollution Control Division
Dept. of Water Resources
Montpelier, Vt.

Dear Bill:

It is obvious to anyone who has taken the Larrabee Point Ferry across Lake Champlain in Shoreham that the polluted water contributes to the air pollution in the Immediate area. The severity, of course, depends on weather and wind direction; however, I have never crossed the lake at that point without noticing the disagreeable odor present during the crossing and at both landings. It is obvious that the odor comes from the water because it disappears soon after you leave the landings unless the area happens to be under the influence of the stack emissions of the International Paper Company.

I have never attempted to evaluate this situation by air sampling and analysis because we were concerned with the population in the whole area. It is my opinion though that some residents would be bothered by emission from the water even if the emissions from the mill were completely eliminated.

Please call on us if we can be of any assistance in your investigation in this area.

Sincerely,

Harry

Harry B. Ashe
Director

HBA:lmb

UTING

[illegible]	[illegible]	
[illegible]	[illegible]	8/2
[illegible]	[illegible]	8/5
[illegible]	[illegible]	8 9

DEPARTMENT OF WATER RESOURCES
MONTPELIER, VERMONT

Exhibit 5

OFFICE MEMORANDUM

ELF 9/17
AWA WA 9/20

TO: Elmer L. Faris

FROM: Paul J. Cummings

SUBJECT: Interviews with people on Lake Champlain between Benson landing to West Bridport RE: Ticonderoga Paper Mill

DATE: September 11, 1968

On September 5, 1968 this writer was advised by A. W. Albert and David Clough to start at Benson Landing in Benson, Vermont and to interview people along Lake Champlain to see what they have to say about the Ticonderoga Paper Mill located in Ticonderoga New York. Mr. Clough advised to go as far as West Bridport, Vermont on Lake Champlain.

INTERVIEWS

1. Mrs. Arnold Munger, Star Route, Benson Landing, Benson, Vermont

This summer during north winds some green stuff believed to be waste material floating down from the Ticonderoga Mill. We always get the smell from the Mill during north winds. We have never seen this green stuff until this summer. The fishing is pretty good down this way. The fish taste okay. The campers and all our families swim in the lake during the summer. We live here year-round.

2. Mrs. Gerald Munger, Benson Landing, Benson, Vermont

Mrs. Munger's story was the same as here mother-in-laws above.

3. Mrs. Roland Hutchins, Benson Landing, Vermont

Mrs. Hutchins advised during the north winds we get the very bad odor from the Ticonderoga Mill. Also this summer there was a oily green material that floated on the water, we have never seen this before until this summer. We had several campers during the summer and they were unable to swim in the lake. The fishing is pretty good and the fish taste okay. This is our tenth summer living here at our camp. We live in Florida during the winter months.

4. Frank Fowler, Jr., R.F.D. #1, Benson Landing, Venson, Vermont

Mr. Fowler is a farmer and has been farming here since 1946. During the north winds we get the odor from the Ticonderoga Mill (sometimes very bad). On the shore there is always a material washing up that looks like sawdust. We have several head of cattle and sometimes they drink from the lake. We have never had any ill effects on any of our cattle drinking this water.

2 OF 5

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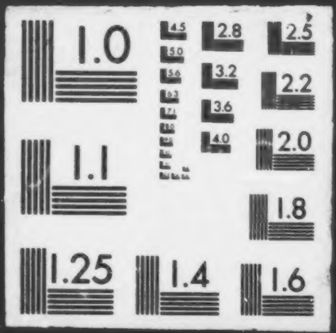
1.0
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2.2
2.0
1.1
1.8
1.25
1.4
1.6

The fishing seems to be okay as I noticed fishermen at times on the lake. I do not fish myself.

5. Dan Rolfe, R.F.D., Orwell, Vermont - Chipman Point Marina

Mr. Rolfe advised after a strong north wind the lake becomes quite calm and then they get the floating material around the docks. The odor is very undesireable for us and it does not help our business. We operate a Resturant, boating, picnic area, camping grounds and general store. Our boating business was down from last year. Fishing is okay and the fish taste okay in this area.

6. Charles Leazer, R.F.D., Orwell, Vermont

Mr. Leazer owns and operates and Marina here on Lake Champlain. During a north wind the odor is very bad but we don't mind this as much as the floating material that floats in and around our dock. This stuff is a grayish black in color and it is 2 to 3 inches thick and when a boat or anything hits it, it crumbles into smaller pieces. The fishing is very bad in this area and if you do catch a fish you can't eat it as it will taste very bad, just the way the Ticonderoga Mill smells like. My boating business has gone down each year, people do not want to stay anywhere near this place.

7. Jerome Viault, R.F.D., Orwell, Vermont (Retired)

Mr. Vianlt stated the smell is awful at times. During the night the smell wakes me up and I have to get up and close my window before I can get back to sleep. The fishing is no good in this area at all. And if you do catch a fish you can't eat them as they taste just like the smell from the mill. Mr. Viault lives in a camp the year-round.

8. Leo Croteau, R.F.D., Orwell, Vermont (Retired)

Mr. Croteau stated when the wind is blowing just right the smell is awful around this area. We do not get any floating material on our shore line. We do swim in the lake in back of our house.

9. Lemore Andet, R.F.D., Orwell, Vermont (Farmer)

Mrs. Audet stated that when the wind is just right we do get the awful odor from the mill. We use the water from the lake for washing and for drinking water for our cattle. During the winter months when the lake has ice on it the water smell awful. Our children swim in the lake during the summer. Our cattle have been drinking the water for a long time, no ill effect on them that we know of.

10. Malcom Douglas, R.F.D. Shoreham, Vermont (Summer)

Once in awhile we get the smell from the mill, mostly during the evening hours and sometimes early in the morning. We do not swim in the lake, however people just north of us do swim in the lake. I do not fish myself, but my son-in-law caught some bass and they always taste pretty good to me. The Ticonderoga sewage is what bothers me the mill is something awful at times.

11. Robert Maquire, R.F.D., Shoreham, Vermont

During a west wind we do get a very strong odor from the mill. The water does have a strong odor to it like to smell from the Ticonderoga Mill. We do not swim in the lake at all in front of our property. About one mile north of us at Watch Point swimming is okay. Mr. Maquire stated if you do catch any fish you can't eat them as they taste awful.

12. Arthur Burrill, R.F.D. Shoreham, Vermont

Works at apple orchard. The only thing that I can say is that the smell is awful at times in this area.

13. Ralph Walker, R.F.D. Shoreham, Vermont, Lapham Bay Area

Lives in area in the summer and Florida during the winter. Mr. Walter stated that 2 or 3 times this year have noticed sulphur on the shore line but has never seen this before. Once in awhile we do get the smell from the mill. The fishing is not very good in this area. Fish do not taste very good.

14. Theodore S. Pererdikas, Athol, Massachusetts

Mr. Peredikas has a camp on the lake in West Bridport, Vermont. When there is a south west wind the smell is very bad in this area. The fishing is not so good in this area as it has been in the past years. I have been coming up here for the past 10 years off and on.

Exhibit 6

GENERAL POLICY, WATER USE CLASSES
and
STANDARDS OF QUALITY
for
INTERSTATE WATERS

(As Adopted May 29, 1967)

State of Vermont
Department of Water Resources
RR-PC-1

State of Vermont
Water Resources Board
Montpelier, Vermont

RULES AND REGULATIONS
Water Quality Standards
Interstate

The Vermont Water Resources Board does hereby adopt and promulgate the following rules and regulations implementing or effectuating the provisions of Title 10, Vermont Statutes Annotated, Chapter 33, and does declare its intent to enforce such rules and regulations as required.

The General Policy for Water Use Classes and Standards of Quality for Interstate Waters and the Water Use Classes and Standards of Water Quality for Interstate Waters, both being adopted by the Vermont Water Resources Board on May 29, 1967, will apply to all streams, ponds and lakes which are contiguous to Vermont and one or more neighboring states, or which flow through Vermont and one or more neighboring states, or which have a tributary contiguous to Vermont and a neighboring state, or flowing from Vermont into a neighboring state, as set forth in the New England Interstate Water Pollution Control Compact, Article I. This action is consistent with Articles V and VI of said Compact, wherein it is provided that; "The Commission shall establish reasonable physical, chemical and bacteriological standards of water quality satisfactory for various classifications of use", and wherein Vermont, as a signatory state, pledged that it would provide for the abatement of existing pollution and for the control of future pollution of interstate waters as set forth above. These rules and regulations are developed in accordance with the provisions of Title 10, Vermont Statutes Annotated, Section 575(a), paragraph (12).

Public hearings were held on December 1, 1966, March 3, 1967, and May 25, 1967, to obtain testimony on the water quality standards. Copies of these rules and regulations and of the standards included by reference are filed with the Secretary of State and with the State Librarian, in accordance with Title 3, V. S. A., Section 703, and with the Town Clerks, and for the convenience of all parties they are also available upon request from the Department of Water Resources.

Attached hereto and made a part hereof is Exhibit A - "General Policy for Water Use Classes and Standards of Quality for Interstate Waters" adopted May 29, 1967, and Exhibit B - "Water Use Classes and Standards of Quality for Interstate Waters" adopted May 29, 1967.

The Board will receive requests as required by Title 10, V. S. A., Section 575(12)(B) for thirty days following the official date of filing of this document with the Secretary of State.

Done at Montpelier, Vermont, this 29th day of May, 1967.

VERMONT WATER RESOURCES BOARD

GENERAL POLICY FOR WATER USE CLASSES AND STANDARDS * OF QUALITY FOR INTERSTATE WATERS

(As adopted May 29, 1967, by Vermont Water Resources Board)

1. The New England Interstate Water Pollution Control Commission acting in accordance with Article V of the Compact has reviewed and revised the "Water Use Classes and Standards of Quality for Interstate Waters" in order to assist the states in the administration of more effective and expeditious water pollution control programs in the New England Compact area. The water Resources Board hereby ratifies the Standards of Quality as revised and adopts them in principle.

2. In the classification of waters due consideration will be given to all factors involved including public health, public enjoyment, propagation and protection of fish and wildlife, and economic and social development. Classifications are not intended to permit indiscriminate waste disposal or to allow minimum efforts of waste treatment under any circumstances.

3. Water quality control problems not specifically referred to in this document shall be evaluated on a case by case basis by the affected states water pollution control agencies and departments of health.

4. Appropriate treatment shall be defined as secondary treatment with disinfection or its industrial waste equivalent as determined by the signatory state regulatory agency. Lesser degrees of treatment or control will be permitted only where it can be demonstrated that attainment of the specified water use class criteria of quality can be effectuated.

5. In the discharge of effluents to the receiving waters, cognizance shall be given both in time and distance to allow for mixing of effluent and stream. Such distances required for complete mixing shall not affect the water usage Class adopted but shall be defined and controlled by the regulatory authority.

6. Recommendations on other waste parameters will constitute a portion of the continuing effort of the Commission in assisting the states in solving interstate water quality problems. The Commission reserves the right to amend or extend the following recommendations as improved standard methods are developed or revisions consistent with the enhancement of water quality are justified.

* Standards have the same meaning as criteria as defined in "Guidelines for Establishing Water Quality Standards for Interstate Waters", published May 1966 by the U. S. Department of Interior, Federal Water Pollution Control Administration.

THE VERMONT WATER RESOURCES BOARD

Water Use Classes and Standards of Quality for Interstate Waters

(As Adopted May 29, 1967)

CLASS A Suitable for water supply and all other water uses; character uniformly excellent. (See Note 11)

1.	Dissolved oxygen	75% saturation, 16 hours/day 5 mg/l at any time
2.	Sludge deposits--solid refuse--floating solids, oils, and grease--scum	None allowable
3.	Color and turbidity	None other than of natural origin
4.	Coliform bacteria per 100 ml	Not to exceed a median of 100 nor more than 500 in more than 10% of samples collected
5.	Taste and odor	None other than of natural origin
6.	pH	As naturally occurs
7.	Allowable temperature increase	None other than of natural origin
8.	Chemical constituents	(See Note 5)

CLASS B Suitable for bathing, other recreational purposes, agricultural uses, industrial processes and cooling; excellent fish and wild life habitat; good aesthetic value; acceptable for public water supply with appropriate treatment.

Standards of Water Quality

1.	Dissolved oxygen	75% saturation, 16 hours/day 5 mg/l at any time
2.	Sludge deposits--solid refuse--floating solids, oils, and grease--scum	None allowable
3.	Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this Class
4.	Coliform bacteria per 100 ml	Not to exceed a median of 1,000 nor more than 2,400 in more than 20% of samples collected.
5.	Taste and odor	None in such concentrations that would impair any usages specifically assigned to this Class
6.	pH	6.5 - 8.0
7.	Allowable temperature increase	Only such increases that will not impair any usages specifically assigned to this Class (See Note 7)
8.	Chemical constituents	(See Note 5)

CLASS C	Suitable for fish and wild life habitat; recreational boating, and industrial processes and cooling; under some conditions acceptable for public water supply with appropriate treatment; good aesthetic value.

Standards of Water Quality

1. Dissolved oxygen	5 mg/l, 16 hours/day; not less than 3 mg/l at any time. For cold water fishery not less than 5 mg/l at any time
2. Sludge deposits--solid refuse--floating solids, oils, and grease --scum	None (See Note 8)
3. Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this Class
4. Coliform bacteria per 100 ml	None in such concentrations that would impair any usages specifically assigned to this Class
5. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this Class
6. pH	6.0 - 8.5
7. Allowable temperature increase	Only such increases that will not impair any usages specifically assigned to this Class (See Note 7)
8. Chemical constituents	(See Note 5)

NOTES

1. These Standards do not apply to conditions brought about by natural causes.

2. Class D waters will be assigned only where a higher water use Class cannot be attained after all appropriate waste treatment methods are utilized.

3. All sewage treatment plant effluents shall receive disinfection before discharge to the watercourse. The degree of treatment and disinfection shall be as required by the state pollution control agency.

4. Any water falling below the standards of quality for a given Class shall be considered unsatisfactory for the uses indicated for that Class. Waters falling below the standards of quality for Class D shall be considered to be in a nuisance condition.

5. Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays including assessment of taste and odor in edible fish shall be performed as required by the appropriate agencies.
For public drinking water supplies the limits prescribed by the United States Public Health Service may be used where not superseded by more stringent signatory state requirements.

6. Radioactivity limits to be approved by the appropriate state agency with consideration of possible adverse effects in downstream waters from discharge of radioactive wastes; limits in a particular watershed to be resolved when necessary after consultation between states involved.

7. The temperature increase shall not raise the temperature of the receiving waters above 68° F for waters supporting cold water fisheries and 83° F for waters supporting a warm water fishery. In no case shall the temperature of the receiving water be raised more than 4° F.

8. Sludge deposits, floating solids, oils, grease and scum shall not be allowed except for such small amounts that may result from the discharge of appropriately treated sewage or industrial waste effluents.

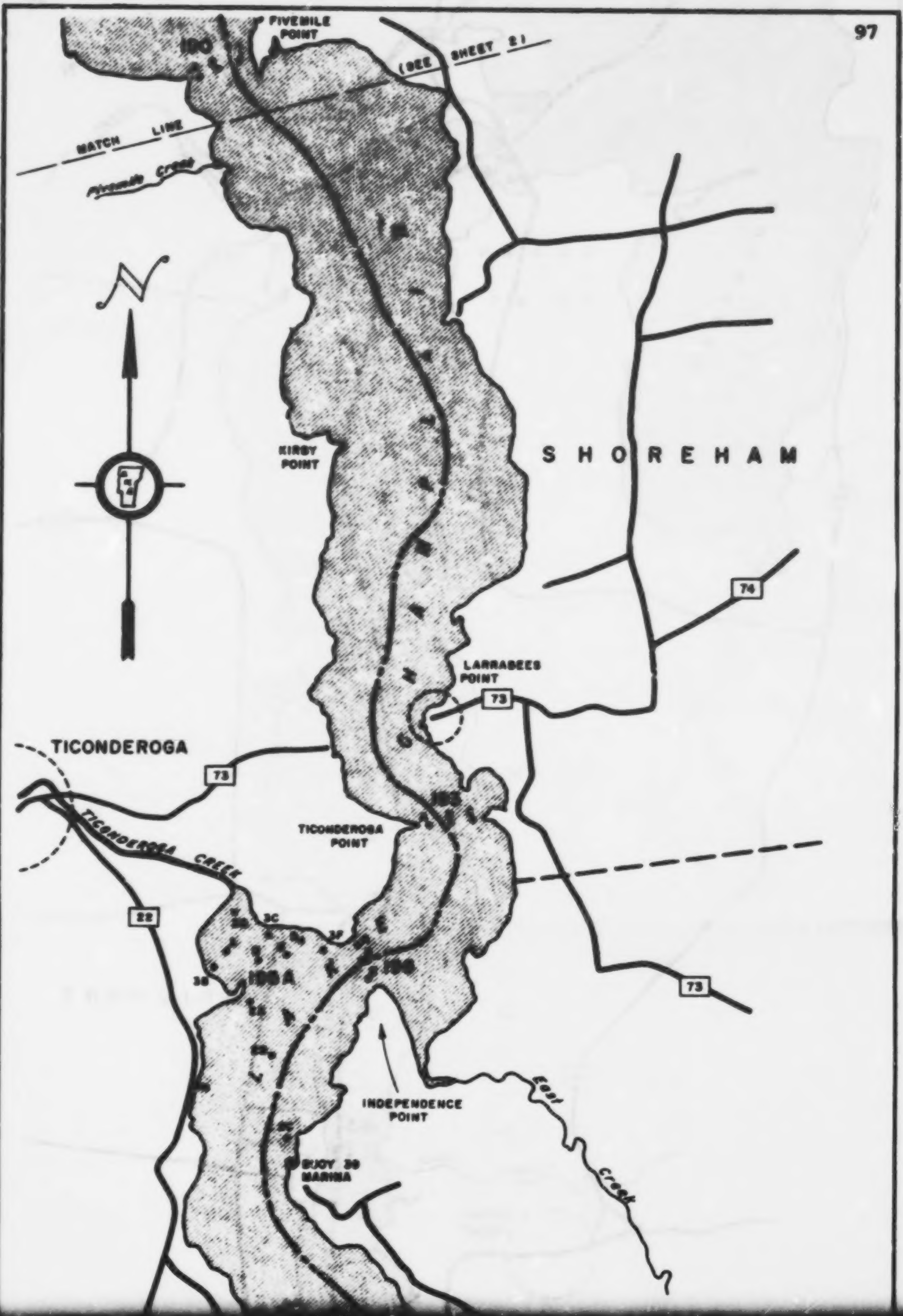
9. The minimum average daily flow for seven consecutive days that can be expected to occur once in ten years shall be the minimum flow to which the standards apply.

10. Class B and C waters shall be substantially free of pollutants that:
    a) Unduly affect the composition of bottom fauna,
    b) Unduly affect the physical or chemical nature of the bottom,
    c) Interfere with the propagation of fish.

11. Class A waters reserved for water supply may be subject to restricted use by state and local regulation.

APPENDIX II

FIGURES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MATCH LINE
Fivemile Creek
N
KIRBY POINT
S H O R E H A M
74
LARRABEES POINT
73
TICONDEROGA
73
TICONDEROGA CREEK
TICONDEROGA POINT
102
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3C
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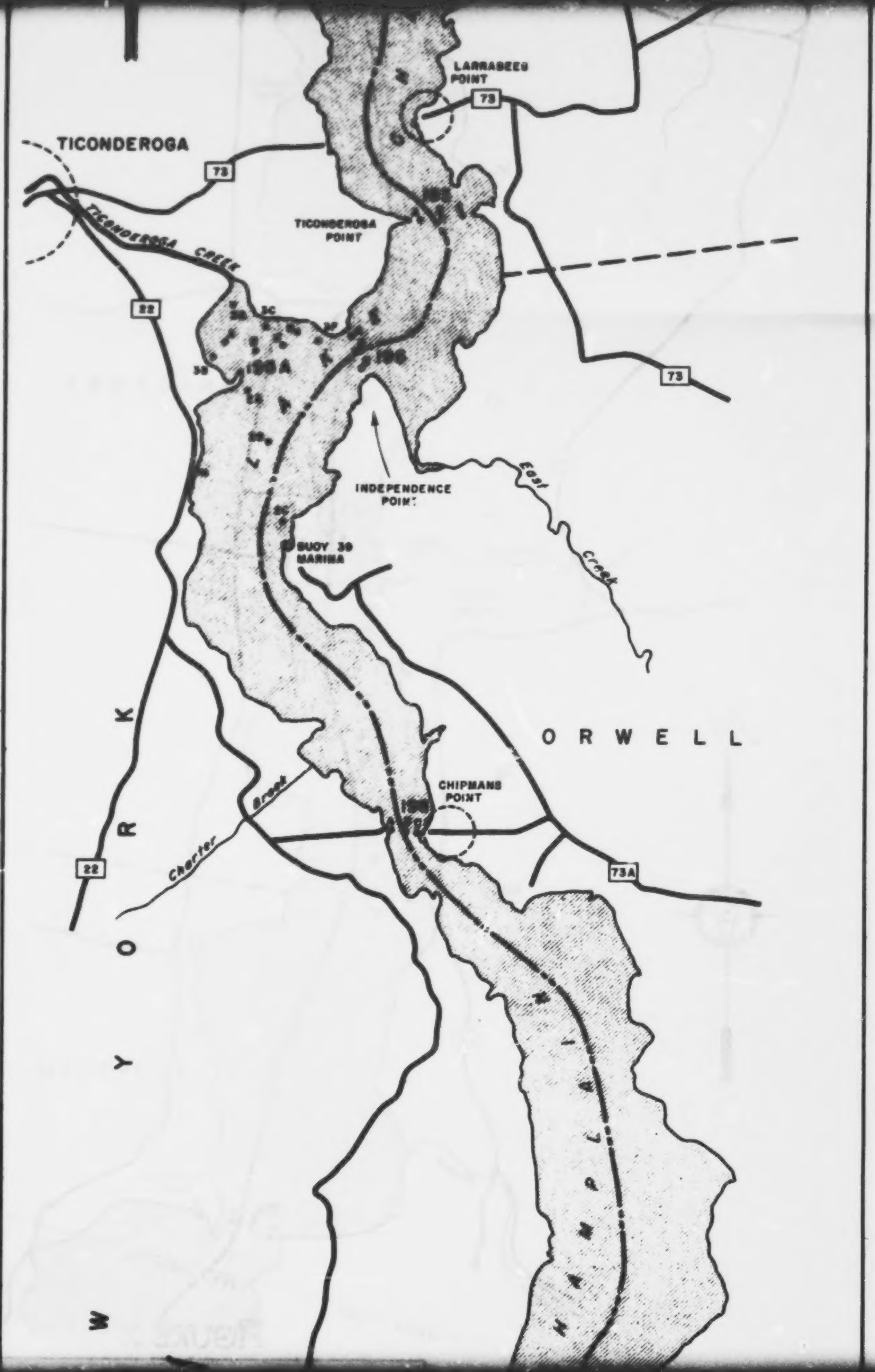
3B
100A
100
73
INDEPENDENCE POINT
East Creek
BUOY 39
MARINA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TICONDEROGA
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3C
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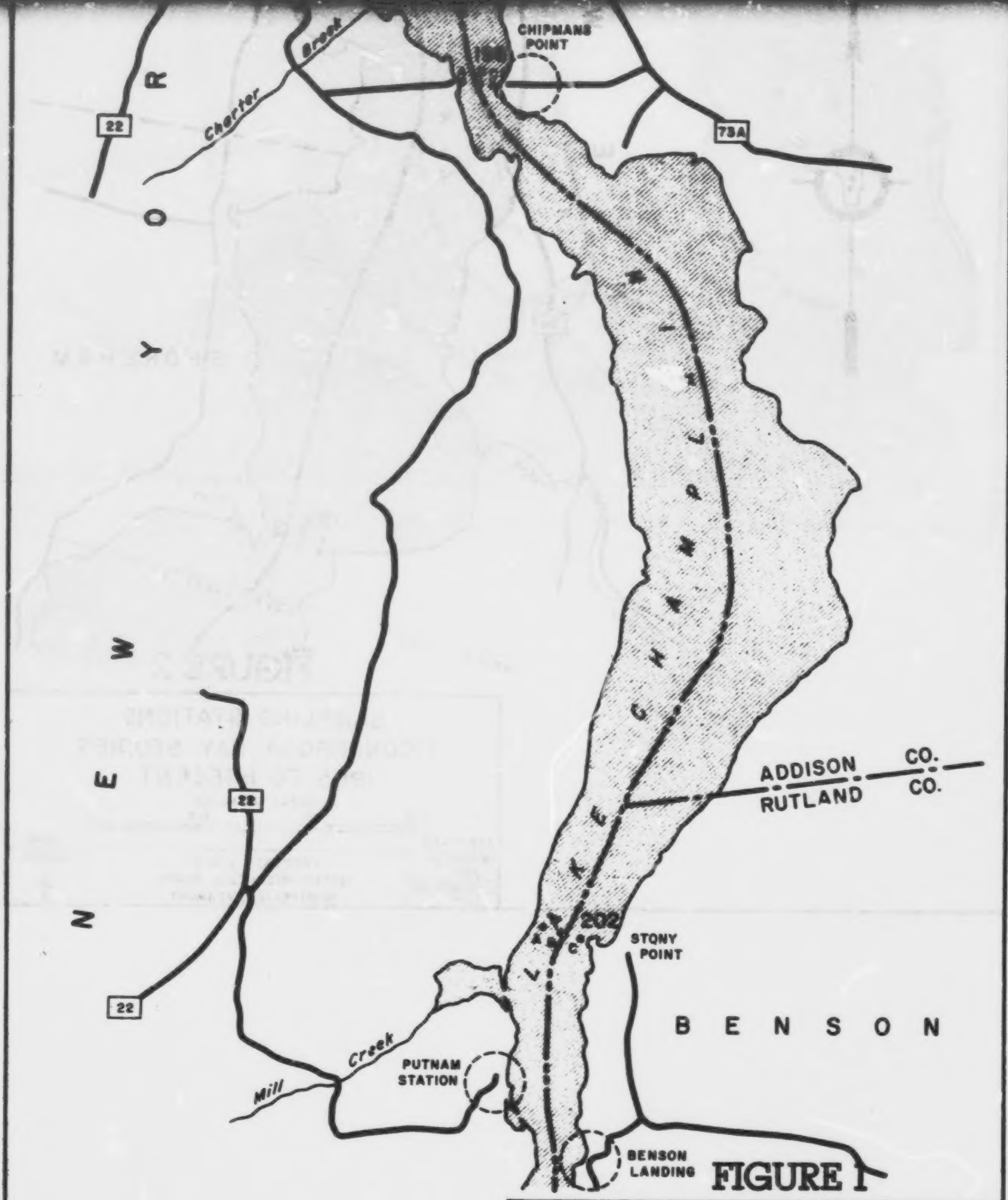
INDEPENDENCE POINT
East Creek
BUOY 39 MARINA
73
ORWELL
CHIPMANS POINT
Charter Brook
22
73A
NEW YORK
CHAMPLAIN


CHIPMANS POINT
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NEW YORK
LAKE CHAMPLAIN
ADDISON CO.
RUTLAND CO.
22
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202
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STONY POINT
BENSON
PUTNAM STATION
Mill Creek
BENSON LANDING

FIGURE 1

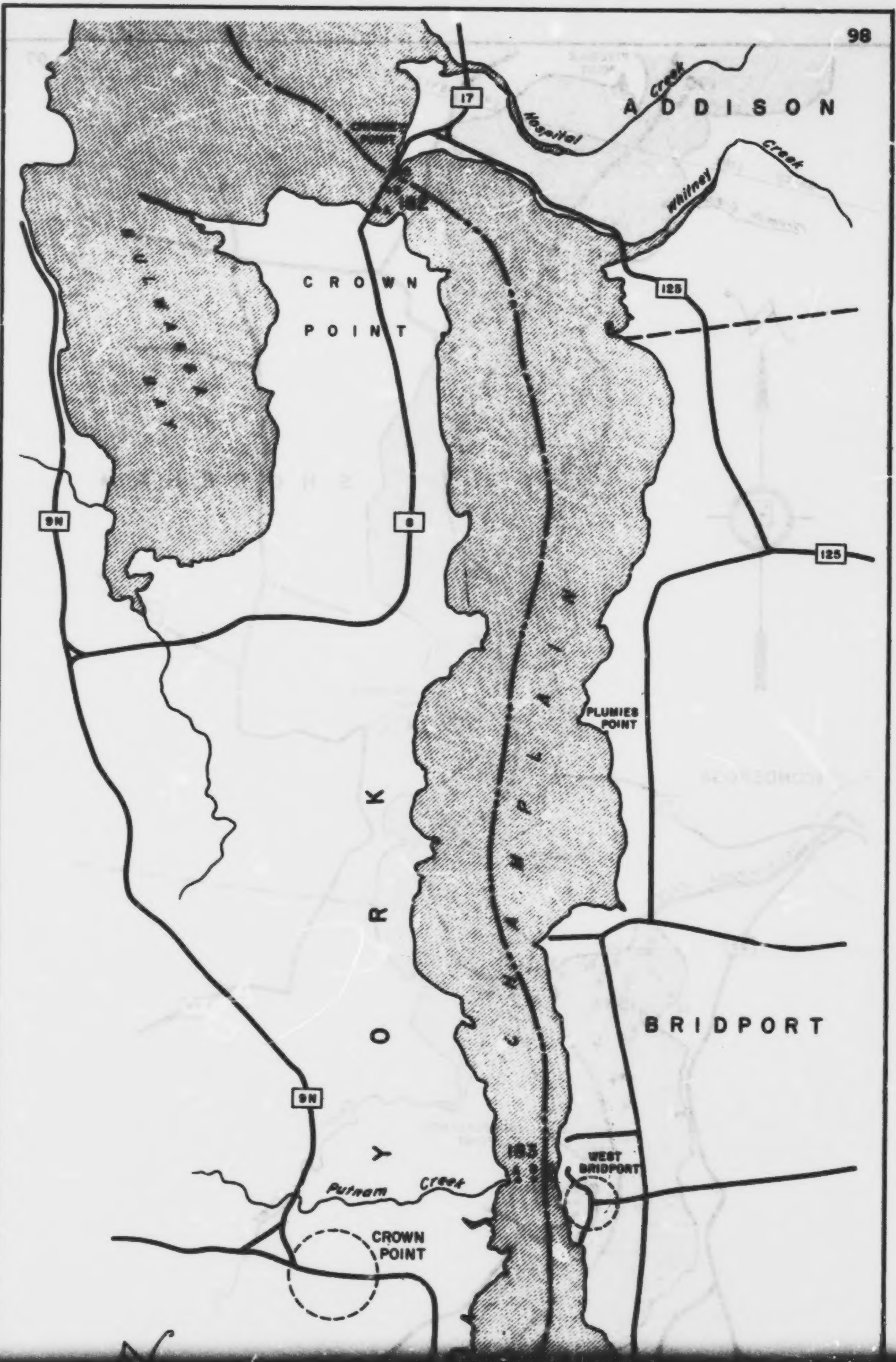
SAMPLING STATIONS
TICONDEROGA BAY STUDIES
1965 TO PRESENT

SCALE OF MILES
0.5 0 0.5 1

APPROVED:

1968

DRAWN BY	VERMONT STATE WATER RESOURCES BOARD MONTPELIER, VERMONT	SHEET 1 OF 2
CHECKED BY JM		


ADDISON
Hospital Creek
Whitney Creek
17
182
CROWN POINT
125
9N
8
125
PLUMIES POINT
YORK
CHAMPLAIN
BRIDPORT
9N
183
WEST BRIDPORT
Putnam Creek
CROWN POINT

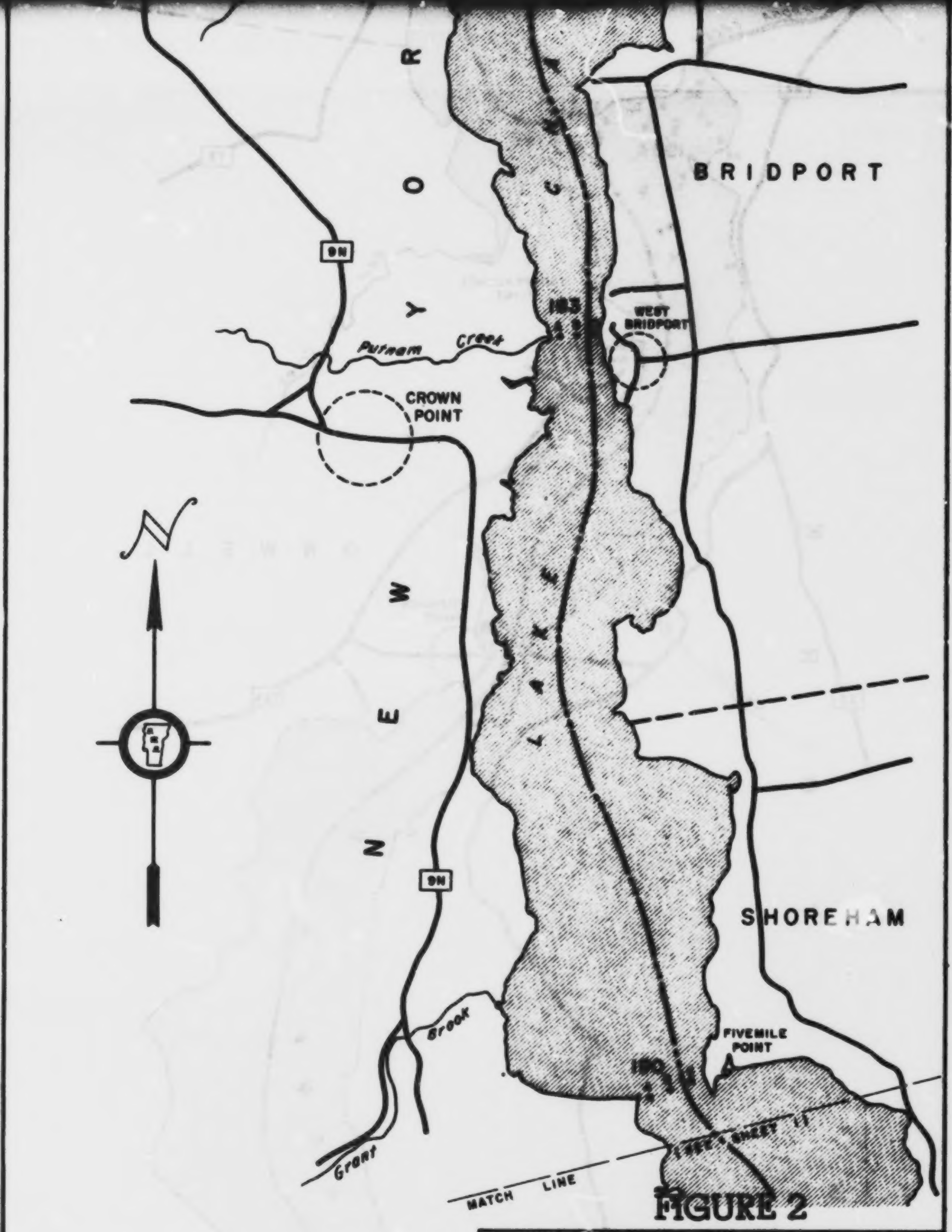

N E W Y O R K
L A K E C H A M
BRIDPORT
9N
183
WEST BRIDPORT
Putnam Creek
CROWN POINT
SHOREHAM
Brook
FIVEMILE POINT
180
SEE SHEET 1
Grant
MATCH LINE

FIGURE 2

SAMPLING STATIONS
TICONDEROGA BAY STUDIES
1965 TO PRESENT

SCALE OF MILES
0.5 0 0.5 1

APPROVED: 1968

DRAWN BY

CHECKED BY JM

VERMONT STATE
WATER RESOURCES BOARD
MONTPELIER, VERMONT

SHEET 2 OF 2

Figure 3: Sludge found floating in Ticonderoga Bay July 1967

Figure 4: Floating Sludge - Ticonderoga Bay. July 1967

Figure 5: Floating Sludge and effervesence - Ticonderoga Bay. July 1967

Figure 6: Effervesence in Ticonderoga Bay. July 1967

Figure 7: Floating sludge and scum - Buoy 39 Marina. September 1968

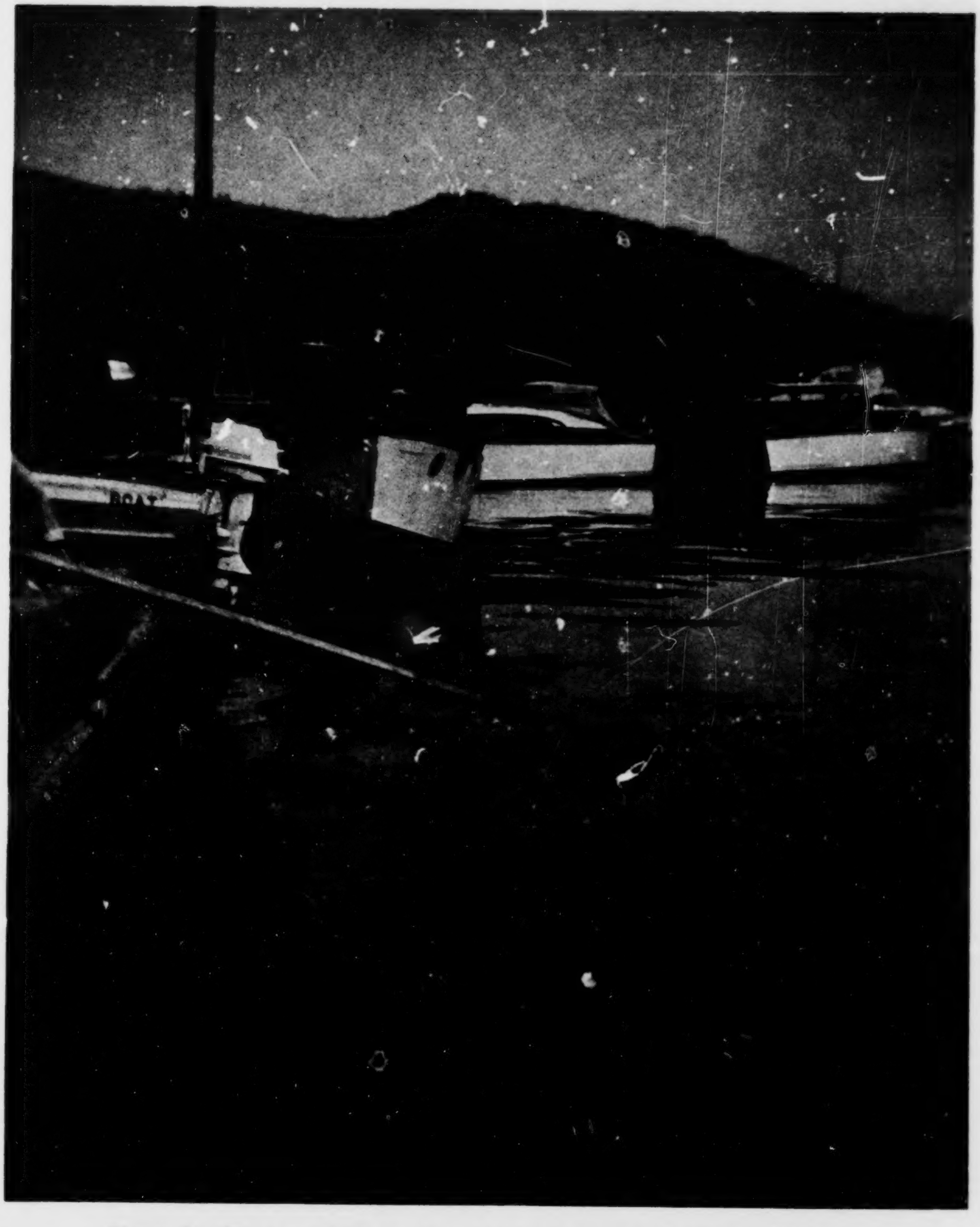


Figure 8: Floating sludge and scum - Buoy 39 Marina. September 1968

BUOY 39 MARINA

Figure 9: Floating sludge and scum - Buoy 39 Marina. September 1968

Figure 10: Floating sludge and scum - Buoy 39 Marina. September 1968

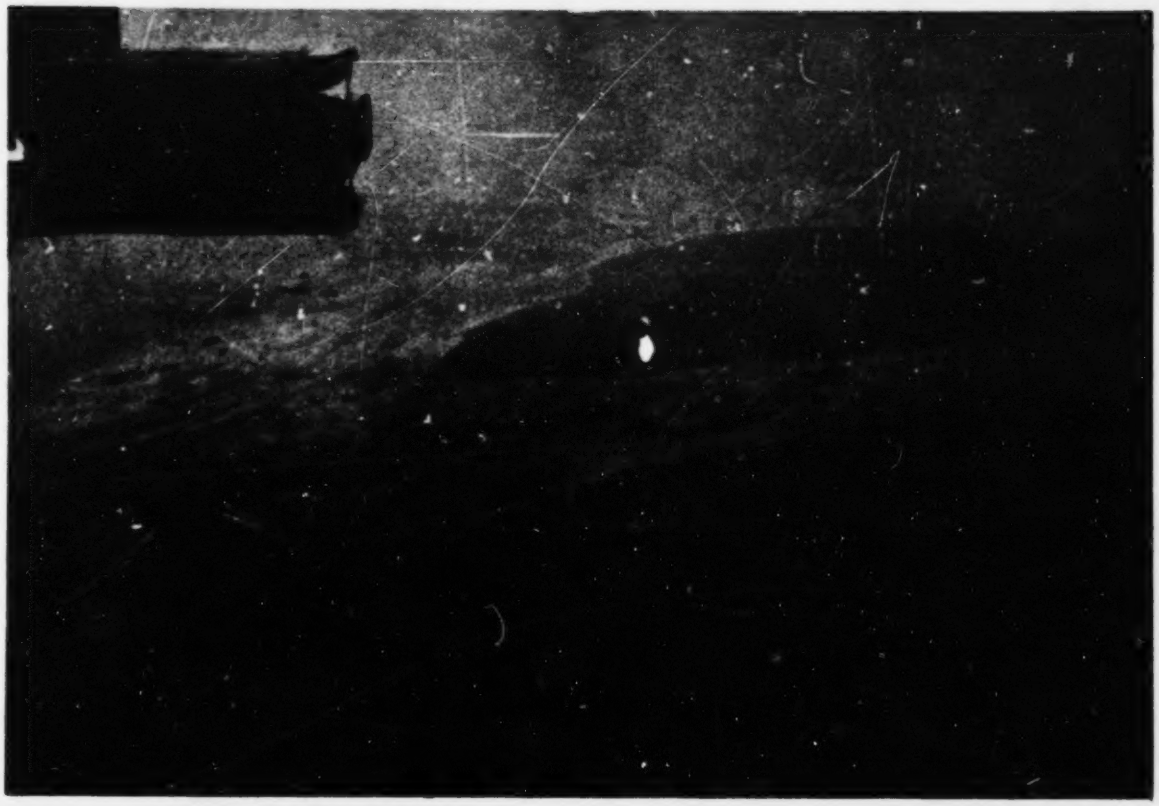


Figure 11: Floating sludge and scum - Buoy 39 Marina. September 1968

the odors but we haven't perfected this technique.

MR. KLASHMAN: Mr. Thieme, did you want to call on anyone else before we move on?

MR. THIEME: I think it would be very helpful in light of several of the questions that have generated here, particularly concerning fish and fisheries, and I would ask James MacMartin or Mr. Halnon to step forward and to advise us a little bit more on this, if they would please.

MR. KLASHMAN: Would you please identify yourself for the record?

MR. HALNON: Leonard Halnon, Chief Fishery Biologist, Vermont Fish and Game Department.

STATEMENT OF LEONARD HALNON, CHIEF FISHERY BIOLOGIST, VERMONT FISH AND GAME DEPARTMENT

MR. HALNON: As far as the question where the fish came from, I am sure I wouldn't be able to tell you that, whether they were New York fish or Vermont fish. We would assume that the distribution is pretty much consistent throughout the area and the fish would move freely from one part of the area to another without recognizing the State boundary. We haven't had any tagged studies made to positively identify the travels of the fish in that area. Now we conducted an intensive ice fishing creel census for a five-year period. That was jointly with the New York

Department of Fish and Game or Conservation Department from 1950 through 1955. We had quite complete creel census records from that survey. There seemed to be a general impression back at that time in contacting fishermen that the quality of the fish was poor. In other words, the food quality was poor. The catch was still relatively good. In other words, the quality of .e fishing was good but the quality of the fish was poor.

Now we made population studies during the summer of 1953 and 1954 and again in 1967 and the entire area from the Champlain Bridge, that is, the Addison-Crown Point Bridge south to the extreme south end of the lake. We did that again in 1967 and comparing the results in 1953 and 1954 with those of 1967 the fish that we actually took were much the same in both of those periods. In other words, comparing 1953 and 1954 with 1967, we took similar specie distribution and numbers of fish in those different periods, but we also note from those collections that as we progressed further northerly toward the Crown Point Bridge, the catches improved in both of those periods. I reviewed those of 1967 in particular and the catches that we took within a mile of Champlain Bridge were far better than those that were taken down at Larrabee's Point and Chipman Point area. Now whatever the cause, there seemed to be something that lead to a poor population of fish in that area immediately adjacent to Ticonderoga Bay. We had no way of coming out and saying that it was from pollution but it was a fact that in that area the fish populations weren't as good as those to be found further north.

Now I have had a good many impressions from the fishermen I have contacted over the years. As far as our own studies are concerned, I would say the fish populations in that area aren't as good as farther north and south of that area. Of course, the payoff is in the quality of fishing to the fishermen. Now they, from what I have observed and learned as time went on, the former large ice fishing colony in the Larrabee's Point-Watch Point area is pretty much gone; they don't fish there any more; there is still a lot of fish there,but they don't fish there any more which would mean that we aren't providing as good quality of fishing in that area as we do in other areas. Just from the general impressions and opinions or statements that I jotted down from talking to people that fish the lake, it is quite uniformly stated there is a bad taste and odor to the fish, and one told me that he got to the point where he wouldn't attempt to cook the fish to eat them without skinning them first. In other words, just scaling the fish wasn't enough; they tried skinning the fish to see if that would improve the eating quality. It was generally stated that there was a bad odor on opening a hole in the ice and most of them stated that there was a visible oily scum in the fishing openings. Some said it was dark and some said it was yellow oily scum. Another thing was the fact that the people that rent shanties and supplies for ice fishermen and others they commonly kept their bait in live boxes immediately under the ice. For a period of several years they couldn't keep their bait alive. And this would go along with the question of sludge deposits coming across on the surface in the summer. I would think that that may happen in the winter, too, under the ice, because, in keeping their bait alive, they found at one period when they wouldn't live just under the ice if they would sink their bait boxes, the fish would live and they would have to lift the box up to get the bait. But then conditions were bad enough so that they no longer attempted to keep bait for sale in live boxes in the lake. They kept them in other places which caused greater inconvenience. Some stated--and this seems to be a question that is significant too —that when water levels were higher and the creeks flowing in greater volume, the winter conditions were not as bad. That is, off and on there was a winter with a higher water level and more water flowing in. They didn't experience quite as many problems sometimes because such things as keeping bait alive when the box is sunk to the bottom would work out during certain periods. It was remarked that the weed beds had disappeared and I was asked about that and I said a good bit of the start of the food cycle for fish would be in vegetation beds, and I surmised the cause of the disappearance, as I told these fishermen, perhaps, it was the sludge deposit smothered out the weed beds.

The fishing colony has decreased greatly in recent years. The walleyed fisherman goes farther north. They no longer patronize that area. So that, as a general summary, the quality of the fish themselves became so poor that the fishermen left and,of course,we weren't supplying the quality of angling so, of course, they moved on.

MR. KLASHMAN: Thank you very much.

Are there any questions of Mr. Halnon? I would like to just ask could you very briefly, please, Mr. Halnon, describe in general the fishery on Lake Champlain? Do you describe it as a sport fishery?

MR. HALNON: At the present time it is completely a sport fishery. I mean if taken by hook and line.

MR. KLASHMAN: Is it a cold-water fishery or a warm-water fishery?

MR. HALNON: That area south of the bridge is all a warm-water fishery.

MR. KLASHMAN: Is there a cold-water fishery in the lake?

MR. HALNON: There is to a certain extent. The smelt, of course, is a cold-water fish which enters into the ice fishing quite extensively. New York and Vermont working together in just recent years had some very encouraging results in an effort to restore such cold-water species as the lake trout. I believe the New York biologist could tell us about what they have done on their own with perhaps rainbow and/or salmon,which we at present aren't trying to restore in the lake. I believe New York has been doing something in that line,but our efforts at the restoration of lake trout is definite. The cold-water species have met with some encouraging results.

MR. KLASHMAN: Thank you very much, Mr. Halnon. If there are no other questions do you have anyone else you would like to call on?

MR. THIEME: Mr. Blake Lawrence of the Lake Champlain Committee, I believe you have a statement you want to make.

STATEMENT OF BLAKE LAWRENCE, VERMONT CO-CHAIRMAN, LAKE CHAMPLAIN COMMITTEE

MR. LAWRENCE: Mr. Chairman, my name is Blake Lawrence. I am Vermont Co-Chairman of the Lake Champlain Committee and I took the trouble this month to visit the area of this plant on Lake Champlain on the Vermont side of the lake and asked people living in this area that I met if this was a troublesome matter for them. The question that was put to them was." We, citizens of the State of Vermont, urge officials of this State to bring about a halt to the air and water pollution in Lake Champlain from the paper mill at Ticonderoga as soon as possible". I have seventy-five or a hundred names and could have gotten a great many more because little effort was made. These petitions were left with people in the garages and in the stores in this area, and I thought this would be of interest to this meeting to show how people in the area feel.

MR. KLASHMAN: Did you want to submit that for an exhibit?

MR. LAWRENCE: Yes.

MR. KLASHMAN: Thank you very much.

MR. THIEME: Thank you, Mr. Lawrence.

MR. KLASHMAN: Was there anybody else at this time?

MR. THIEME: Mr. Chairman, I think at this point that I would ask that we hold further witnesses until the others have had a chance to make basic presentations and I would call additional people if it were necessary to further substantiate Vermont's position.

MR. KLASHMAN: Thank you.

(The above-mentioned petition follows.)

We, citizens of the State of Vermont, urge Officials of this State to bring about a halt to the air and water pollution in Lake Champlain from the paper mill at Ticonderoga as soon as possible.

Signed	Address
Richard Roberts	Vergennes, VT.
Beverly Norton	Bridport VT.
Margaret Rother	Bridport, VT.
Frank Rotter	Bridport Vt.
Hubert Norton	Bridport Vt.
Alden Plouffe	Bridport Vt
Cora Ethier	Bridport Vt
Orren Sunderland	Bridport, Vt.
Leo Hotte	Bridport, VT.
Roger St. George	Bridport, Vt.
Waldo Swinton	Bridport Vt
Frederick A. Myrick	Bridport, VT 05734
Michael Duclos	Bridport, VT 05734
Frederick Rudick	Bridport, Vt 05734
Lucien Hotte	Bridport vt - 05734
Robert R Mundy	Bridport Vt 05734
Roy Scragg	Shoreham Vt - 05734
Rene A La Berge	Bridport Vt - 05734
Rebecca H. Hustis	Bridport, Vermont 05734
Meredith L. Anderson	Bridport, Vt
Roscoe H. Pratt	Bridport Vt.

Name	Address
Wanda Sunderland	Bridport, Vt
Joan Myrick	Bridport, Vt.
Mr. & Mrs. H. K. Chandler	Bridport Vt
Audrey M. Hayes	Bridport, Vt.
Dorothy Manning	Bridport, Vt.
G. H. Senecal	Cornwall, Vt.
Clifford J. Huestis	Bridport Vt.
G. R. Bingham Jr	Middlebury Vt.
~~Carl [illegible]~~	Bridport Vt.
Carmel Ouellette	Bridport Vt
Marie Swinton	Bridport Vt
Kathryn Myrick	Bridport, Vt 05734
Dorothy Piper	RFD 1, Vergennes, Vt. 05491
Dale H Stone	Bridport Vt 05734
George Kingsbury	Bridport Vt.
Mrs Stephen Goddard	Bridport, Vt
Mr. & Mrs Duane Torrey	Bridport, Vt
Mrs. Leighton Riley	Bridport, Vt.
Mrs. Vivian Jackson	Bridport, Vt.
Rita Myrick	Bridport, Vt
Robert Myrick	Bridport, Vt
R. L. Roscorla	" "
Raymond B. Baines	" "
R. W. Myrick	" "
J. F. Crittenden	Shoreham Vt.
Jean Carter	Bridport, Vt

9070

Name	Address
Reginald Nadeau	Bridport Vt
Donald Larrabee	Bridport VT.
Jeannette Cooke	Bridport Vt
Nathan Smith	Bridport Vt
Pauline Danforth	Bridport, VT.
Leo J. Connor Jr	Bridport, Vt.
Roberta May White	Addison V.T
Ralph A Wiggin	Addison V.T.
A D Barnard	Shoreham Vt.
Lionel Sunderland	Shoreham.
Dr. + Mrs. J.F Basque	Bridport, Vt
Simone Duclos	Bridport, Vt
Sharon Louise Christina Carl	Bridport, Vt
Lawrence Myrick	Bridport, Vt.
Helen N. Girard	Bridport, Vt 05734
Mrs Carol Hotte	Bridport, Vt
Roseanna Hotte	Bridport, Vermont
Gary A Cooke	" "
Rene A Brisset	" "
Virginia L.S Cowles	Shelburne, Vt

We, the undersigned, citizens of, and visitors to Vermont, are harrassed by the air pollution from the paper plant of the International Paper Company at Ticonderoga, and disturbed by pollution of the waters of Lake Champlain from the same source.

We, therefore, urge the Officials concerned of the State of Vermont, to direct that this long-standing nuisance and pollution, be halted.

NAME	ADDRESS
Kent Hewitt	Orwell, Vt
Florine H. Hewitt	Orwell, Vt.
Lillian C. Hambeck	Orwell Vt.
Nellie B. Eddy.	Orwell Vt-
Chas L. Eddy	ORWELL, VT.
MaryAnne Eddy	ORWELL
Louella Parry	Orwell
Everett Putney	Orwell
Earl W. Parry	Orwell
Lee Parry	Orwell
Mrs. George B. Wright	Orwell
Gerald Barker	Orwell
John J. O'Shea	Orwell
Michael McE. Cunningham	Benson
Irene M Warren	Shoreham
Pauline Maguire.	Shoreham
J. Robert Maguire.	Shoreham

NAME	ADDRESS
Helen K. Witherell	Shoreham, Vt.
Justine W. Blodgett	Shoreham, Vermont
Elizabeth M. Willson	" "
[redacted]	
[illegible]	SHOREHAM VT
Robert L. Doane	Shoreham Vt.
Helen M. Cooke	Shoreham, Vt.
Norman Matot	Shoreham Vt
Phyllis Allen	Shoreham Vt
Francis McTulley	" "
Thomas Cooke	" "
Mary Bishop	" "
M. C. Little	" "
T. H. Russell	Brandon, Vt.
William Evert	Bristol VT
Doris Fournier	Shoreham Vt.
Paul Blair	Shoreham Vt
Reginald Matt	Shoreham Vt.
Michael [illegible]	Middlebury, Vt.
Thomas H Cook	Shoreham Vt
James Kehoe	Shoreham Vt
Reginald Matt	Middlebury Vt.
Arlen D. Stanley	Shoreham Vt.
Shirley J. Wetterman	Whiting, Vermont

Edith C. Pyle	Shoreham
Mrs Rosemary K. Mackey	West Deal, New Jersey
William C. Mackey	" " " "
Frances E. [illegible]	Shoreham Vt
Robert H. Buckley	Basin Harbor, Vt.

MR. KLASHMAN: I will now call on Mr. Walker to present the Federal case, presentation.

MR. WALKER: The Federal Water Pollution Control Administration has prepared a report on the subject waters and I would like to ask Mr. Albert Bromberg, who is Chief of Operations at our Edison, New Jersey, facility for FWPCA, to present this report.

MR. BROMBERG: Thank you, Mr. Walker.

STATEMENT OF ALBERT BROMBERG, CHIEF OF OPERATIONS, HUDSON-DELAWARE BASINS OFFICE, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

MR. BROMBERG: Mr. Chairman, my name is Albert Bromberg and I am Chief of Operations at the Hudson-Delaware Basins Office of the Federal Water Pollution Control Administration. I would like to present to you our Report on Pollution of the Interstate Waters of Lake Champlain and its Tributaries.

In the interest of time I will omit reading certain pages of this report but I request that its entire contents be submitted for the record.

MR. KLASHMAN: It shall be so done.

MR. BROMBERG: For those of you who have copies of this report I will read excerpts directly from it, starting on Page 1.

I. BASIN CHARACTERISTICS

Description of Area

This report is concerned primarily with the waters of Lake Champlain. The Lake Champlain drainage basin is bounded on the north by the Canadian border, on the east by Lake Memphremagog and the Connecticut River Basin, on the south by the Hudson River Basin and on the west by the St. Lawrence River Basin. The maximum length of the basin is 115 miles from the summit of the Champlain canal at Lock No. 9 near Fort Edward, New York, north to the Canadian border. At its greatest width the basin reaches 105 miles from the Saranac Lake in the west to the Winooski head waters in the east. From South Bay to the Canadian border the boundary line between the States of New York and Vermont lies within Lake Champlain.

I will skip the sections dealing with climate, topography, geology, hydrology, hydrography and most of the economic section, reading one paragraph, the second complete paragraph on Page 4.

The economy of the **basin** has developed substantially because of its natural resources. These resources have been a major factor in supporting the paper, woodworking and mining industries located in the basin. State and Federal tourist data indicate that there is an accelerating demand for participation in the basin's aesthetic environment through travel and recreational activities.

I go now to Page 5 which starts the area dealing with water uses. Again, I will skim briefly mentioning major water uses and a very minor comment with regard to them.

Water Supply

Lake Champlain is used as a source of water supply by 14 municipal systems serving approximately 67,000 people.

Recreation

The open waters and shorelines of Lake Champlain are used extensively for recreational activities, primarily during the summer months.

Bathing

Bathing beaches and facilities located along the shores of Lake Champlain reflect the demand for this activity in the Lake.

Boating

Lake Champlain is extensively used for pleasure boating.

Sport Fishing

Sport fishermen are attracted to Lake Champlain by the presence of a wide variety of sport fish. This is true not only for the summer but also in the winter when ice-fishing is popular.

Waterfowl

Lake Champlain lies on one of three vital waterfowl migration routes in the mid-section of the Atlantic Flyway. The lake and its immediate adjoining area provides suitable waterfront habitat.

Navigation

The Champlain Canal is an important segment of the New York State Barge Canal System carrying commercial shipping into Lake Champlain.

I now go to Page 7 which is entitled "SOURCES OF POLLUTION". I will read a major portion of this section.

The waters of the Lake Champlain Basin receive the discharge of wastes from municipalities, industries, Federal installations, septic tanks and cesspools, commercial and recreational boating, surface runoff and agricultural land drainage.

Municipal Waste

A total of 28 municipal systems serving approximately 115,000 persons discharge wastes which may have a significant effect on the waters of Lake Champlain. Information on these waste sources, which include 16 discharges in New York and 12 in Vermont, is summarized in Table III-1. Figures III-1 and III-2 show the general location of each waste source reported and are keyed to the Table. Of these sources, nine serving 21,000 persons discharge untreated wastes, 18 serving 85,000 persons provide primary treatment, and one at St. Albans, Vermont, serving 9,000 persons provides secondary treatment. Chlorination of the effluent is known to be provided in 17 plants.

Of these 28 systems, seven, serving about 24,000 persons, discharge treated and untreated wastes directly to Lake Champlain. The Burlington, Vermont, (Main Plant) primary treatment facility is the largest of these systems. Westport, New York, serving 700 persons is the only system discharging untreated waste into the Lake.

The remaining 21 systems, which serve approximately 91,000 persons, discharge into tributary waters. Eleven of these systems are located in New York and ten are in Vermont. Of these 21 systems, there is only one secondary treatment plant. This facility, located at St. Albans, Vermont, serves 9,000 persons. Primary treatment is provided at 12 plants serving 62,000 persons. The facility at Plattsburgh, New York, is the largest of these primary systems. The remaining systems, five of which are in New York and three in Vermont, discharge untreated waste from 20,000 persons. The largest of these systems are Whitehall and Ticonderoga in New York, and Winooski and Colchester Fire District No. 1 in Vermont.

Industrial Waste

Industrial Wastes are a major pollution problem in Lake Champlain. The wastes from 19 industrial operations, **nine** in New York and ten in Vermont, affect the waters of the Lake. Three discharge directly to Lake Champlain and the remainder to tributaries. Table III-2 lists and provides information on these waste sources. Figures III-1 and III-2 show their location.

The total Biochemical Oxygen Demand (BOD) expressed in population equivalents (PE) which is discharged directly to the lake from industrial operations in New York is estimated to be 180,000 population equivalents. I might mention that population equivalents is defined in an insert page to the report if you are not familiar with it. The lake is also affected by the additional discharge to tributaries of 385,000 PE. Essentially all of this BOD waste load is from pulp and paper plants, which also contains substantial amounts of fibrous suspended solids, as well as refractory organics where chemical pulping is practiced. In addition, an iron ore processing operation discharges inert suspended solids to a tributary.

There are no significant industrial waste discharges directly into the lake from Vermont. However, an estimated 45,000 PE, of which approximately 30,000 is from one pulp and paper plant, are discharged into tributaries. In addition, substantial amounts of suspended solids enter the lake from the Poultney River as the result of waste discharges from a number of slate operations.

Industrial waste discharges significantly affect Lake Champlain at two locations--the Ticonderoga Creek area and Cumberland Bay near Plattsburgh. International Paper Company, Ticonderoga, New York, carries out Kraft pulping, papermaking and bleaching, and discharges waste into Ticonderoga Creek about two miles above its confluence with the lake. At Plattsburgh, New York, two pulp and paper plants, Georgia Pacific Corporation and Diamond National Corporation, discharge wastes directly to Lake Champlain. The Georgia Pacific Corporation operation consists of neutral sulfite semi-chemical pulping and papermaking, and Diamond National has mechanical pulping and papermaking. Imperial Paper Company, with mechanical pulping and papermaking, discharges its waste into the Saranac River about two miles above its confluence with the Lake at Plattsburgh. All of these plants discharge substantial amounts of solids and organic material.

Federal Installations

There are 30 Federal installations located near Lake Champlain. These installations generate a total volume of approximately 0.8 MGD consisting primarily of domestic waste. Of these 30, 15 discharge to municipal systems, 14 provide treatment with final disposal of the effluent to the ground and one (Plattsburgh Air Force Base) discharges to surface waters.

Plattsburgh Air Force Base, Plattsburgh, New York, discharges 0.02 MGD of treated effluent to the Saranac River. This waste, resulting from aircraft washing operations, is discharged after treatment consisting of floatation, flocculation settling, pH adjustment and skimming.

All sorts of pollution in Lake Champlain include the discharge from septic tanks, cesspools, overflow from combined stormwater collection systems and from recreational boating.

I will now pass on to Page 10 which is entitled "WATER QUALITY".

A survey was conducted by the Federal Water Pollution Control Administration during the period of August 19-26, 1968, to determine quality in the waters of Lake Champlain. The details describing the survey and the results are summarized in Appendix C. Data compiled by the States of New York and Vermont and the Lake Champlain Study Center of the University of Vermont were used to supplement FWPCA data.

The data were evaluated in terms of parameters established by the water quality standards for these waters. Specific parameters such as temperature, dissolved oxygen, bacteria, suspended solids, nutrients, color and turbidity, which generally characterize water quality and highlight the effects of pollution, are discussed below.

Although specific data were not collected for the interstate tributary waters of the Missisquoi, Poultney and Mettawee Rivers, available information on municipal and industrial waste sources, as well as State water quality data, indicates pollutional problems exist in these waters.

Temperature

Temperature is an important physical parameter since it affects the solubility of dissolved oxygen, rates of chemical and bio-chemical reactions, bacterial growth rates and the growth of biological flora and fauna. The temperature of a water body will depend upon the climate of the area and the water depth. Deep waters usually show a smaller response to climatic change than shallow waters. Waters of deep lakes become thermally stratified. The colder, denser water remains in the bottom while the warm waters cover the surface. These water layers, called the hypolimnion and the epilimnion respectively, are separated by a thermal transitional zone called the thermocline. Circulation between these zones remain limited until climatic conditions are such that a uniform water temperature profile is established.

The survey by FWPCA in August 1968 indicates that the southern end of Lake Champlain from South Bay to Crown Point was not stratified and had a uniform temperature. In the main body of the **lake**, from Crown Point to Rouses Point, stratification was encountered. The epilimnion, that is, the upper waters, ranged in depth from 20 to 60 feet and in temperature from 18 to 20 degrees Centigrade. The thermocline ranged in thickness from 10 to 50 feet and the hypolimnion was found to start from 50 to 100 feet below the surface with temperatures of from seven to 11 degrees Centigrade.

The Northeast Arm of the Lake is also stratified but to a lesser extent than the main body of the lake. The epilimnion was found to be 50 to 60 feet deep with a temperature between 20 to 22 degrees Centigrade. The hypolimnion begins at 80 to 90 feet from the surface and has a temperature of about 15 degrees Centigrade.

Shallow areas of the main lake and the Northeast Arm were not found to be stratified.

Dissolved Oxygen

Dissolved Oxygen (DO) is one of the most significant parameters of water quality. Adequate levels of DO are necessary to support fish and other forms of aquatic life. Organic pollution results in the utilization of DO in the receiving water during stabilization of the waste material by bacteria. Oxygen is transferred from the atmosphere or from the photosynthetic production by aquatic plants to replace the oxygen used up during the decomposition of the organic matter. Where the oxygen demands of organic pollution remove all of the dissolved oxygen, aneorbic conditions exist and the waters become septic and foul smelling, thus creating obnoxious environmental conditions.

Lake Champlain receives the discharge of organic material from a variety of pollutional sources. The discharge of these waste materials into waters with limited dilution or restricted circulation can result in depressed DO concentrations that are less than required for the beneficial use of the waters. The FWPCA sampling program showed that DO levels ranged from a minimum of 1.4 to a maximum of 10.4 milligrams per liter (mg/1). Saturation values ranged from 16 to 107 percent. Dissolved oxygen levels for both surface and deep waters were generally the same, with most stations showing a variation of less than 10 percent. However, several stations in the Northeast Arm and most of those in the Ticonderoga area showed significantly larger DO variations.

Figure IV-1 presents the DO profile of surface stations (five feet deep) from Whitehall to Rouses Point along the State line. Dissolved oxygen levels in the main Lake (Port Henry to Rouses Point) were found in all cases to be greater than 8.0 mg/1. Levels in the southern portion (Whitehall to Port Henry) were somewhat less, with values in the Ticonderoga area depressed to less than 5.0 mg/1, indicating the effect on the Lake of wastes entering from Ticonderoga Creek.

Figure IV-2 illustrates the DO profiles found in the Ticonderoga area from Chipman Point to Five Mile Point. Dissolved oxygen in this area was critically depressed to values less than four mg/1, with a minimum of 1.4 mg/1 at Mount Independence Point. A joint survey conducted by the FWPCA and the States of New York and Vermont in August 1966 showed a similar depressed oxygen condition in the Ticonderoga Creek area. Other studies by the Lake Champlain Study Center at the University of Vermont further confirm the depressed oxygen condition in the Ticonderoga area.

A low DO value of 5.8 mg/1 in the main Lake occurred at one station in Cumberland Bay, indicating a localized pollutional condition caused by the municipal and industrial waste discharges in the Plattsburgh area. Two deep stations in the Northeast Arm showed DO values of 5.1 and 5.2 mg/1, with percent saturations of 51 and 52, respectively. Both of these samples were collected from the hypolimnion, that is, the deeper waters, and suggest the effect of decomposition of accumulated organic matter and restricted circulation due to stratification.

Bacteria

Bacteria from human wastes can constitute a major water pollution problem. These organisms enter the waters of Lake Champlain through the discharge of inadequately treated wastes.

Coliform organisms are used as an indicator to assess bacterial contamination. They can originate from the wastes of warm-blooded animals and are found naturally in soils. The results of the FWPCA sampling program show that total coliform counts ranged from a maximum of 320,000 per 100 ml near Ticonderoga Creek to as low as 8 per 100 ml in the main Lake. Figure IV-3 presents a profile of total coliform densities from surface stations along the State line.

At this point I am afraid I am going to have to apologize to you because we have an error in this particular figure. I think we have tried to correct it in the copies, the figure in the copies of the report. The data for Stations 3 through 18 have been displaced to the high side by an order of magnitude of 10. In other words, where we see values lying up here for these stations they should be down here between 100 to 1000.

I will continue with the second paragraph on Page 12. Excuse me, I am up farther.

> Total coliform values south of Port Henry were generally higher than in the main lake, supporting the water quality pattern developed by the DO profile discussed previously. Exceptionally high levels were found in the Ticonderoga Creek area where values approached 15,000 per 100 ml, that is, of the samples taken along the State line. A significantly high count of 28,000 per 100 ml was also found near Whitehall. In contrast, coliform levels in the main lake were in most cases less than 1,000 per 100 ml. Three counts greater than 1,000 per 100 ml were found in the lake stretch from near the Otter Creek outlet to the Ausable River outlet.
>
> Total coliform counts throughout the Ticonderoga Creek area are shown in Figure IV-4. All samples in the immediate area of Ticonderoga Creek showed a total coliform level in excess of 5,000 per 100 ml. The maximum count of 320,000 per 100 ml was found near the Creek outlet. Data collected during the 1966 survey, that is, the joint survey by FWPCA, Vermont and New York, also show high coliform counts, further confirming the serious bacterial condition in this area.

At certain other areas, such as Cumberland Bay, Port Henry, Westport in New York, and Shelburne and

Burlington Bays in Vermont, elevated total coliform levels were found to occur.

Analyses for fecal coliform concentrations, which represent an indication of recent contamination of the environment with feces of warm-blooded animals, were made at all stations during the August 1968 survey. Figure IV-5 shows a fecal coliform profile for the surface stations taken in Lake Champlain along the State line. Fecal counts in the main lake were generally less than four per 100 ml, suggesting that the high total coliform levels discussed earlier may be the result of natural surface runoff. Significantly higher counts occurred in the Whitehall and Ticonderoga Creek area where fecal coliform levels reached values of 1,800 and 800 per 100 ml, respectively. As shown in Appendix Table C-1, a maximum value of fecal coliform in the Ticonderoga Creek area reached 11,000 per 100 ml.

There are no criteria established by the applicable water quality standards which provide levels for fecal coliform concentrations. Studies on the Ohio River as reported by the National Technical Advisory Committee to the Secretary of the Interior on Water Quality Criteria, indicate that detectable health effects may occur where the fecal coliform level is about 400 per 100 ml. Based upon this study, pollutional problems resulting from contamination by human or animal excreta appear to exist in the areas of Ticonderoga, Whitehall. and in Cumberland

Bay.

Suspended Solids

Suspended solids from industries, municipalities and other sources decrease the aesthetic value of the lake while in suspension and form objectionable bottom deposits on settling. The sludge blanket formed covers and destroys the natural aquatic life on the bottom. The organic matter in the sludge undergoes decomposition which reduces dissolved oxygen in the overlying waters, at times below that needed for survival by fish and other aquatic life. When depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious gases which appear as bubbles on the surface. These gases frequently break loose masses of the deposited sludge and lift them to the surface where they appear as unsightly clumps.

In Lake Champlain, this problem is most significant in the southern section. Slate and quarrying operations on the Poultney River and its tributaries discharge inorganic suspended solids that are essentially inert. These solids affect the stream and ultimately reach Lake Champlain waters. A large pulp and paper plant on Ticonderoga Creek discharges large amounts of suspended solids which enter the Lake. These suspended solids include a large proportion of decomposable organic matter.

Surveys by the FWPCA in August and September 1968 disclosed extensive sludge deposits in Lake Champlain at the mouth of Ticonderoga Creek and in the northwest corner of Cumberland Bay. The sludge delta at Ticonderoga Creek was extensively sampled and the results are summarized in Figure IV-6. In the immediate vicinity of the mouth of the Creek and near the New York shore southwest of the mouth, grey sludge with a fibrous texture and a hydrogen sulfide odor was found. In places, this sludge measured over 12 feet deep. Gas bubbles and floating solids were prevalent on the surface and several masses of sludge were observed coming to the surface. In the deeper waters between the mouth and the New York-Vermont State line, the bottom was a dark ooze with fewer fibers. In water 10 to 20 feet deep, few fibers were found in the ooze and the hydrogen sulfide odor was slight. This bottom was also characteristic of the area between the mouth and the shore north of the Creek. This type of bottom gradually gave way to a soft clay with a slight hydrogen sulfide odor. At points 400 yards south, 800 yards northeast and 600 yards due east of the mouth of the Creek, the tainted bottom gave way to a sand-clay bottom that had no odor. Despite the clean bottom, floating solids were found along the Vermont shore north of Catfish Bay.

Nutrients

Nutrients stimulate the growth of algae and other aquatic plants resulting in the deterioration of water quality. Although over 20 elements are necessary as nutrients for aquatic plant growth, deficiencies in phosphorus and nitrogen are believed to be the most common restraining factors. Municipal waste is a significant source of phosphorus and nitrogen in these waters. Other sources include agricultural runoff and drainage, discharge from boats, percolation from cesspools and septic tanks, industrial wastes, and waterfowl.

There is considerable evidence that low concentrations of phosphate and nitrogen will support algal growth. Levels of phosphate in the range of 0.01 to 0.04 mg/1 as phosphorus (0.03 to 0.12 mg/1 as phosphate) have been reported as being able to support prolific growths of both suspended and attached algae. The generally accepted value for the minimum concentration of nitrogen required for algal growths in fresh water is 0.3 mg/1 as nitrogen.

Results of the FWPCA study show that although most stations had values of phosphate and nitrogen above the critical levels, algal blooms were not encountered. Attached filamentous algae and rooted aquatic plants were limited to a narrow band near the shore. St. Albans Bay, Vermont,is one area where a significant algal problem exists.

Color and Transparency

Color in surface waters may be the result of natural phenomena such as land runoff, or may originate from industrial or other waste discharges. Transparency, as recorded by Secchi disc readings, is a measure of the clarity of water. Transparency is affected by the presence of suspended solids and color.

Figures IV-7, which is the figure showing color, and IV-8 show the color and transparency, respectively, of Lake Champlain from Whitehall to Rouses Point. Both profiles emphasize the drastic difference between the southern part and the main body of the lake. Principal factors which contribute to the increased color and reduced transparency in the southern part are: (a) resuspension of settled material by the passage of commercial vessels because of the shallow depth; (b) suspended solids and color discharged from a large pulp and paper mill to Ticonderoga Creek; and (c) the discharge of inert suspended solids from slate and quarrying operations along the Poultney River and its tributaries.

On Page 15 "POLLUTION CONTROL PROGRAMS" I will skip through this section reading only certain portions.

State Programs

The Water Quality Act of 1965 amended the Federal Water Pollution Control Act and provided for the establishment of water quality standards for interstate waters. Under the provisions of the Act, the States were given the option of setting water quality standards by June 30, 1967, for interstate waters or portions thereof within their borders. The standards established had to be consistent with the purposes of the Act which are "...to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution."

Since the establishment of that Act both the States of Vermont and New York have submitted water quality standards which have been accepted with minor exceptions in the case of Vermont. These standards also contain implementation schedules for the construction of remedial waste treatment facilities, which are to be constructed by 1972. A listing containing these implementation schedules is contained in the Appendix in Table A-1 and Table B-1. Those are Tables respectively for New York and Vermont.

On Page 16 under "General" and I think we might call that "General Comments regarding Water Quality Standards."

Comparison of the best usage and the specific criteria for adjacent classified waters of the respective States, that is, New York and Vermont, reveals some differences. The water quality standards accepted for the waters of Lake Champlain range from a "B" in Vermont to "AA" through "C" in New York. New York State held a hearing on October 9, 1968 to consider the reclassification of its waters of lower Lake Champlain from "C" to "B". Should this proposed reclassification become effective, only a small portion of Lake Champlain (Deep Bay) would remain as a "C".

In the main body of the Lake, the Vermont "B" includes such water uses as bathing and public water supply with appropriate treatment while the New York "AA" uses include water supply for drinking, culinary or food processing purposes. In the lower portion of the Lake, the Vermont "B" is as previously defined, the present New York "C" is for fishing and the proposed reclassification to "B" would provide for bathing and any other usage except as a source of water supply. Differences also exist in specific criteria for these classifications, particularly dissolved oxygen, coliform density and temperature.

I will skip the portion on Interstate Programs and I will read Construction Grant Program on Page 17.

Construction Grant Program

In the Lake Champlain drainage basin to date, the Federal Water Pollution Control Administration has spent or allocated about $7.9 million of the area's total waste facilities construction cost of $26.1 million. This includes 12 projects in New York with a $.95 million FWPCA allocation and $5.7 million total construction costs, and 36 projects in Vermont with a $6.98 million FWPCA allocation and $20.4 million total construction costs. Table V-1 lists these projects.

I will now skip to the front part of the report labeled "SUMMARY AND CONCLUSIONS." They are on Roman numeral VIII. That would be the eighth page in from the cover.

SUMMARY AND CONCLUSIONS

1. The waters of Lake Champlain, from the Champlain Canal in the south to the Canadian Border to the north, and that portion of its tributary basin which affects the lake, receive the discharge of treated and untreated wastes from industries, municipalities, a Federal installation, individual septic tanks and cesspools, recreational and commercial boating, and agricultural and land drainage.

2. As a result of these discharges the interstate waters of Lake Champlain and its tributaries are polluted by the presence of bacteria, solids, oxygen demanding material and nutrients. In addition, some of these waters are affected by the accumulation of bottom sludge deposits and floating sludge masses. This pollution limits the use of these waters for such activities as recreational bathing, boating and general aesthetic enjoyment. Bacterial contamination, in particular, presents a health hazard to persons using these waters.

3. Pollution of interstate waters subject to abatement under Section 10 of the Federal Water Pollution Control Act, as amended, occurs in Lake Champlain: (1) in the vicinity of Ticonderoga Creek, as the result of the discharge of untreated waste from the Village of Ticonderoga and from the International Paper Company plant; and (2) near Whitehall, as the result of the discharge of raw sewage from the Village of Whitehall.

4. As the result of discharge of untreated industrial

waste, several areas of Lake Champlain contain extensive sludge deposits. The major deposits center near the mouth of Ticonderoga Creek, and are due mainly to the discharge of untreated paper mill wastes from the International Paper Company.

5. Both New York and Vermont have adopted water quality standards for Lake Champlain which have been approved by the Secretary of the Interior. Under these standards, orders have been issued or voluntary construction schedules established by the respective States for the abatement of all major waste sources, including those sources listed in Item 3 above. And those sources in Item 3 are the Village of Ticonderoga and the International Paper Company. These schedules call for construction of remedial facilities by 1970, with the following exceptions: Port Henry, Willsboro and Rouses Point, New York, scheduled for completion in April 1972; Alburg, Vt. scheduled for June 1971; Swanton, Vt. for January 1972; and Missisquoi Specialty Board, Sheldon Springs, Vt. for December 1972.

RECOMMENDATIONS

1. Water quality standards and criteria for both New York and Vermont shall be compatible. Existing standards shall be adjusted to permit use of these waters for water supply with adequate treatment, water contact recreation, and propagation of fish and wildlife. Water quality at the State line shall meet the following requirements:

a. Dissolved Oxygen - not less than 5.0 mg/1 at any time.

b. Temperature - The temperature of the epilimnion shall not be raised more than 3°F. above that which existed before the addition of heat of artificial origin. The increase shall be based on the monthly average of the maximum daily temperature. No discharges are to be permitted in the hypolimnion.

c. Bacteria - Fecal coliform shall be used as the indicator organism for evaluating the microbiological suitability of recreational waters. As determined by multiple-tube fermentation or membrane filter procedures and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.

2. All waste treatment facilities shall remove not less than 85 percent BOD at all times. Adequate disinfection shall be provided as necessary to comply with the water uses established by the State, Interstate and Federal water quality standards.

3. Studies shall be carried out and completed by September 1, 1969, to determine the extent of sludge deposits,

the need for removal, and if the sludge deposits are to be removed, the ultimate disposition of the sludge and the estimated cost of removal.

4. Schedules for construction of remedial facilities, established by the States under the water quality standards and approved by the Secretary of the Interior, shall be maintained, and I refer you to Paragraph 5 under Summary and Conclusions.

That, Mr. Chairman, is my presentation.

MR. KLASHMAN: Thank you very much, Al. Are there any questions? Mr. Haberer.

MR. HABERER: I have no questions. I did want to point out on Page 10 of the report the statement that the southern end of the lake was not stratified and had a uniform temperature because this is a question in some people's minds. This has bothered me.

MR. KLASHMAN: Do you want to put that map on? Mr. Haberer, would you mind pointing out the southern part of the lake?

MR. HABERER: Well, the southern part of the lake from South Bay to Crown Point.

MR. KLASHMAN: Do you know what the depths are there?

MR. HABERER: I was told it was about 20 feet, but I would like the man who made the statement to confirm it.

MR. KLASHMAN: Al, do you know what the depth is?

MR. BROMBERG: The depths range. There are two spots

I think that go over 30 feet but the majority range from 20 to the high 20s.

MR. KLASHMAN: And you have made the point there was no stratification and had a uniform temperature.

MR. PELOQUIN: I have the same comment Mr. Haberer has that the Federal report states no stratification from South Bay to Crown Point and on the recommendations with regard to temperature, Recommendation b., indicates the temperature of the epilimnion shall not be raised more than 3°F accordingly and I question the feasibility of this recommendation in view of no stratification.

MR. KLASHMAN: We will have your comment noted. Do you have anything?

MR. THIEME: I would make one inquiry concerning the portion on Color and Transparency on Page 14, the last part of the second paragraph calls attention to the discharge of inert suspended solids from slate and quarrying operations along the Poultney River and its tributaries and it shows one rather high value for color. I wondered how many samples were taken and at how many stations. We have data in our report - it is that report on the water quality pollution control of the Poultney-Mettawee Watershed which shows quite a number of stations at which similar data was taken and our data there does not suggest anything like the problem that is suggested in your material.

MR. BROMBERG: Might I answer that?

MR. KLASHMAN: O.K. Go ahead.

MR. BROMBERG: The data that we present is the result of a, I should say, a one shot survey of it by us in a week. So that data represented on these plots are representative of one sample only in space and time. The comment with regard to the last part of the second paragraph under Color and Transparency did not relate specifically to the one high value we found under the graphs. The plots of color and transparency were changed upon information obtained from the Vermont Department of Water Resources. I assumed this is backed up by the data you just pointed out. Ours is one value in space and time and it may show a half high value. Whether that value exists at all times is very subject to question.

MR. KLASHMAN: Mr. Thieme, is there suspended solids and color from your studies discharged into the Poultney River? Does that get down to that location? I am not sure I understand. In other words, do your studies show an effect? I believe there are slate operations there.

MR. THIEME: Do you have the chart showing the sample locations?

MR. KLASHMAN: Mr. Thieme, if you would rather look into that further we can answer that question later.

MR. THIEME: Mr. Chairman, I don't have a map readily available identifying sample stations from the data I was looking at. However, staff advised me that it is not an influence to the extensive turbidity on the lake, but this is introduced to Hubbardton River and this is of natural origin.

MR. KLASHMAN: That's the question I wanted answered, Mr. Thieme. According to your studies there was no effect on the lake.

The Poultney River is a boundary line so that there is - New York is interested in that too then, aren't they?

MR. THIEME: I believe the portions affected by our operations are higher up.

MR. KLASHMAN: You mean by the time it gets down to them there is no --

MR. THIEME: Your question was whether there was an effect on the lake?

MR. KLASHMAN: Yes, that's right, and what about the effect on New York in the interstate water?

MR. THIEME: I would have to defer an answer at this time.

MR. KLASHMAN: Why don't we have that question answered later for the record? Will you make a note that Vermont will answer the question? The question is whether the slate operations on the Poultney River affect that section of the river which forms the boundary between New York and Vermont.

Mr. Haberer.

MR. HABERER: I wanted to comment. Is this the time to comment on some of these recommendations? Instead of asking questions, to comment.

MR. KLASHMAN: If you want to comment on the staff's report you are free to do so.

MR. HABERER: I wanted to bring to the attention of the group here "a.", the item under "a.", Recommendations 1. a. Dissolved Oxygen - not less than 5 parts per million, I want you to understand that this is a higher value than the reclassification we are in the process of trying to get for the lower end of Lake Champlain. Our "B" standard was only required to be 4 and I want you to know that this standard is higher than the standard we are aiming for.

MR. KLASHMAN: Excuse me, Mr. Haberer. Do I understand that the standard you are aiming for in the New York portion of the water might be 4 and what you hope to achieve is 5 at the border?

MR. HABERER: That could be true, yes. Our standards only require 4 up to the border.

MR. KLASHMAN: How does this tie in with the New England Interstate?

MR. HABERER: New England Interstate has a dissolved oxygen criteria based on the percentage of saturation with no less than 5.0 mg/l at any time.

MR. KLASHMAN: Well, are these inconsistent?

MR. HABERER: Well, I think New York waters would be somewhat inconsistent in view of the testimony of the fishery represented from Vermont that the fishery in the lower portion of the lake is a warm-water fishery. Trout waters are less than 5 parts per million and non-trout waters are less than 4 parts per million so that 4 parts per million are required here. However, as I will indicate later, in classification actions where there has been a difference of this type New York officials have always agreed to maintain the waters at a level consistent with the New England Interstate standards so that approval of the classification at the lower end of Lake Champlain we would expect the water would be maintained at the 5 mg/l level at the border, that is, at the State border.

MR. KLASHMAN: Is there anything else that you want to say, Mr. Haberer?

MR. HABERER: I want to mention that our standards for degree...

MR. KLASHMAN: Excuse me, I want to make clear that I am not necessarily agreeing with what was said. I am noting what was said.

MR. HABERER: Item No. 2. All waste treatment facilities shall remove not less than 85 percent BOD, I wanted to get into the record the requirement in New York State ranges from 75 to 95 in the secondary treatment range and the 85 would, of course, be higher than our lowest standard.

MR. KLASHMAN: And you require disinfection of all waters. Is there anything else, Mr. Haberer?

MR. HABERER: And the September 1st deadline in Item No. 3 seems to be a very short period of time for a study; it may take longer.

MR. KLASHMAN: Are there any other comments?

MR. THIEME: I would raise one question concerning the data in Recommendation 3 September 1, 1969, more specifically with regard to who will conduct this study. Will this be conducted by the Federal establishment or would it be something expected of the States.

MR. KLASHMAN: The reason the staff put it in this way was because we were thinking of some type of a cooperative study. But what we had in mind actually was to try to do something this winter.

We want to explore what can be done while the ice is on the lake to see whether borings might be carried out. It is much simpler during that period and finish up so that we could complete it by September 1969 but we can discuss this further if this seems unreasonable.

Mr. Thieme, Mr. Miller wants to raise a question. I am just trying to go according to protocol. Mr. Miller.

MR. MILLER: Thank you, Mr. Thieme. Thank you, Mr. Chairman.

I note with a great deal of interest the temperature requirements. I would like to ask if this does not break new ground as far as our existing standards are concerned.

MR. KLASHMAN: Mr. Thieme, I would like to, if I may, defer the answer to this question for now. We are going to ask Dr. Tarzwell, who is the Chairman of the Secretary of the Interior Committee on Wildlife to answer that. There was a National Technical Advisory Committee for the Secretary of the Interior for water quality criteria, and Dr. Tarzwell, who is a member of our Administration and was Chairman of the Fish and Wildlife group will discuss what their thoughts were on this. If you don't mind, we will delay it until then.

MR. MILLER: Any comment on this until after that?

MR. KLASHMAN: Yes.

MR, MILLER: All right, thank you very much.

MR. THIEME: Mr. Chairman, I would also comment I believe the recommendations, as I understood your earlier remarks, would be considered by the Conferees.

MR. KLASHMAN: Yes, these recommendations are by the technical staff. Are there any other questions?

I would like to just raise a question for the record. Did you do any work at all on the effluents from the International Paper Company at Ticonderoga on bacteria?

MR. BROMBERG: Yes, we have. During the past week we have conducted some studies of the Ticonderoga Creek both above the Village of Ticonderoga and above the mill and below the mill in the vicinity of the lake and also several selected effluents of the mill itself.

MR. KLASHMAN: Could you summarize your data and then submit it for the record?

MR. BROMBERG: Yes, I could. Would you like me to verbally summarize it?

The data we collected during the past week indicated that the headwaters of Ticonderoga Creek, which drains Lake George, the bacteria count in terms of total coliform and fecal coliform were extremely low. In the Creek above the paper mill the counts had increased significantly, possibly due to discharge of untreated waste from the Village of Ticonderoga. Below the mill in the stream the counts were of the same general order of magnitude as they were above the mill. However, several effluents that were sampled from the mill did indicate high total coliform and fecal coliform counts. However, I want to point out that, due to the age of International

Paper Company mill in Ticonderoga that several of the town effluents combined with and discharged with some of the mill effluents.

MR. KLASHMAN: What levels did you get from these? What's the magnitude?

MR. BROMBERG: In the Creek above the mill they were in the order of per total coliform hundreds of thousands, two or three hundred thousand per 100 mls.

MR. KLASHMAN: And this was due to the sanitary wastes from the Village of Ticonderoga?

MR. BROMBERG: I think so, yes, because this sampling site was above the mill.

MR. KLASHMAN: Fine, and then?

MR. BROMBERG: In the stream below the mill the counts were in the order of one hundred thousand per 100 ml.

MR. KLASHMAN: This is total coliform?

MR. BROMBERG: This is total coliform, and in the lake at the mouth of the stream the counts were in the hundreds per 100 mls. This is total coliform.

MR. KLASHMAN: How about fecal coliform?

MR. BROMBERG: Fecal coliform counts range to extremely low at the Lake George entrance or outlet of Ticonderoga Creek to --

MR. KLASHMAN: What do you call extremely low?

MR. BROMBERG: 2 per 100 mls. which is at the lower limit of the measurability of this test. To the tens of thousands, that is, 40 or 50,000 per 100 mls in the stream above the mill. Again, as you indicated before, pointing out the contribution from the Village of Ticonderoga probably. Then, going to the neighborhood of the tens of thousands per 100 ml in the stream below the mill and then dropping in the neighborhood of 100 per 100 ml in the lake.

MR. KLASHMAN: Thank you, Mr. Bromberg, very much. Would you submit for the record a tabulation of the results which you found?

MR. BROMBERG: Yes, I will.

MR. KLASHMAN: Are there any other questions?

(no response)

MR. WALKER: Mr. Chairman, that completes the presentation for the Federal Water Pollution Control Administration and I thank Mr. Bromberg for the presentation.

(The Federal Report, in its entirety, follows.)

CWT 10-4

Report on
POLLUTION OF THE INTERSTATE WATERS
of
LAKE CHAMPLAIN AND ITS TRIBUTARIES

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
NORTHEAST REGION
NORTH ATLANTIC WATER QUALITY MANAGEMENT CENTER
Edison, New Jersey 08817
November 1968

GLOSSARY OF WATER POLLUTION TERMS

Biochemical Oxygen Demand (BOD) - the amount of oxygen required by living organisms while decomposing organic matter in the presence of oxygen as measured by the 5-day 20°C BOD test.

Population Equivalent (PE) - the pollutional effect of various waste discharges expressed in terms of a corresponding effect of discharging raw sewage from an equivalent number of human population. Based on the ratio of pollutional matter (expressed in terms of BOD) to the per capita amount of the same pollutional matter normally found in domestic sewage. For example:

$$PE = \frac{\text{\# BOD of waste per day}}{.17\ \text{\# BOD of domestic waste per capita per day}}$$

Primary Treatment - the physical removal of floatable and settleable solids, and BOD from municipal and industrial wastes. Treatment consisting of primary settling and skimming can generally remove 25-30 percent of the BOD, 45-65 percent of the total suspended matter, and substantially all floatable and settleable material.

Secondary Treatment - the treatment of organic wastes by primary treatment followed by a biological process and secondary settling. Secondary treatment can generally remove 80-95 percent of the BOD and suspended matter, and substantially all floatable and settleable material.

Save-all - an industrial treatment process (sedimentation, flotation or filtration) used to recover fibers.

Thermocline - A layer of water in a thermally stratified lake separating an upper, warmer, lighter zone from a lower, colder, heavier zone.

Epilimnion - the layer of water above the Thermocline in a fresh water lake or pool.

Hypolimnion - the layer of water below the Thermocline in a fresh water lake or pool.

REPORT ON
POLLUTION OF THE INTERSTATE WATERS
OF
LAKE CHAMPLAIN
AND ITS
TRIBUTARIES

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
NORTHEAST REGION
NORTH ATLANTIC WATER QUALITY MANAGEMENT CENTER
Edison, New Jersey
November 1968

ADDENDA

for

Report on Pollution of the Interstate Waters of Lake Champlain and Its Tributaries

Further information from state water pollution control agencies have resulted in several changes in the municipal and industrial waste inventories.

Table III-1

Delete waste sources Mineville and Grover Hill Housing.

Add waste source Claymore SD, Ticonderoga (T), N. Y. Information on facility is as follows: Population served 25; collection system, separate; primary treatment, design flow, 0.008 MGD; receiving water, Lake Champlain.

Change receiving water for Moriah SD #1 from Lake Champlain to Mill Brook, Lake Champlain.

Change receiving water for Moriah SD #2 from Lake Champlain to Tributary of Mill Brook, Mill Brook, Lake Champlain.

Table III-2

Add waste source Delaware & Hudson Railroad, Whitehall, N. Y. Untreated oil wastes from this facility discharge into the Champlain Canal, Lake Champlain.

Table A-1

Delete waste sources Mineville and Grover Hill Housing.

Add waste source Claymore SD, Ticonderoga, N. Y.; receiving water, Lake Champlain.

Change receiving water for Moriah SD #1 from Lake Champlain to Mill Brook, Lake Champlain.

Change receiving water for Moriah SD #2 from Lake Champlain to Tributary of Mill Brook, Mill Brook, Lake Champlain.

"Lake Champlain is, as you are aware, an interstate body of water and its resources are of great importance to the States of Vermont and New York. In order that these resources may be conserved it is necessary that the purity of its waters be maintained. Therefore a determination of the present condition of the lake, the effect of the wastes which are being poured into it, and the conditions which are likely to arise in the future if present practices with reference to waste disposal are continued is highly desirable."

Excerpt from a letter dated March 31, 1904, to the Director of the United States Geological Survey from the Honorable John G. McCollough, Governor of the State of Vermont, requesting an examination of the water of Lake Champlain.

INTRODUCTION

On the basis of a written request from the Commissioner of the Vermont Department of Water Resources, and on the basis of reports, surveys, or studies, in accordance with Section 10 of the Federal Water Pollution Control Act (33 U.S.C. 466 et seq.), the Secretary of the Interior called a conference in the matter of pollution of the interstate waters of Lake Champlain and its tributary basin (New York-Vermont).

This report is based on recent studies conducted by the Department of the Interior, Federal Water Pollution Control Administration in addition to data obtained from other Federal, State and local agencies.

We gratefully acknowledge the cooperation of the Vermont Department of Water Resources, the New York State Health Department and the Lake Champlain Study Center of the University of Vermont.

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SUMMARY AND CONCLUSIONS

1. The waters of Lake Champlain, from the Champlain Canal in the south to the Canadian Border to the north, and that portion of its tributary basin which affects the Lake, receive the discharge of treated and untreated wastes from industries, municipalities, a Federal installation, individual septic tanks and cesspools, recreational and commercial boating, and agricultural and land drainage.

2. As a result of these discharges the interstate waters of Lake Champlain and its tributaries are polluted by the presence of bacteria, solids, oxygen demanding material and nutrients. In addition, some of these waters are affected by the accumulation of bottom sludge deposits and floating sludge masses. This pollution limits the use of these waters for such activities as recreational bathing, boating and general aesthetic enjoyment. Bacterial contamination, in particular, presents a health hazard to persons using these waters.

3. Pollution of interstate waters subject to abatement under Section 10 of the Federal Water Pollution Control Act, as amended, occurs in Lake Champlain: (1) in the vicinity of Ticonderoga Creek, as the result of the discharge of untreated waste from the Village of Ticonderoga and from the International Paper Company plant; and (2) near Whitehall, as the result of the discharge of raw sewage from the Village of Whitehall.

4. As the result of discharge of untreated industrial waste, several areas of Lake Champlain contain extensive sludge deposits. The major deposits center near the mouth of Ticonderoga Creek, and are due mainly to the discharge of untreated paper mill wastes from the International Paper Company.

5. Both New York and Vermont have adopted water quality standards for Lake Champlain which have been approved by the Secretary of the Interior. Under these standards, orders have been issued or voluntary construction schedules established by the respective States for the abatement of all major waste sources, including those listed in Item 3 above. These schedules call for construction of remedial facilities by 1970, with the following exceptions:

Port Henry, N. Y.	April 1972
Willsboro, N. Y.	April 1972
Rouses Point, N. Y.	April 1972
Swanton, Vt.	January 1972
Alburg, Vt.	June 1971
Missisquoi Specialty Board, Sheldon Springs, Vt.	December 1972

RECOMMENDATIONS

1. Water quality standards and criteria for both New York and Vermont shall be compatible. Existing standards shall be adjusted to permit use of these waters for water supply with adequate treatment, water contact recreation, and propagation of fish and wildlife. Water quality at the State line shall meet the following requirements:

a. Dissolved Oxygen - not less than 5.0 mg/l at any time.

b. Temperature - The temperature of the epilimnion shall not be raised more than 3°F. above that which existed before the addition of heat of artificial origin. The increase shall be based on the monthly average of the maximum daily temperature. No discharges are to be permitted in the hypolimnion.

c. Bacteria - Fecal coliform shall be used as the indicator organism for evaluating the microbiological suitability of recreational waters. As determined by multiple-tube fermentation or membrane filter procedures and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.

2. All waste treatment facilities shall remove not less than 85 percent BOD at all times. Adequate disinfection shall be provided as necessary to comply with the water uses established by the State, interstate and Federal water quality standards.

3. Studies shall be carried out and completed by September 1, 1969 to determine the extent of sludge deposits, the need for removal, and if the sludge deposits are to be removed, the ultimate disposition of the sludge and the estimated cost of removal.

4. Schedules for construction of remedial facilities, established by the States under the water quality standards and approved by the Secretary of the Interior, shall be maintained (See Par 5, Summary and Conclusions).

I - BASIN CHARACTERISTICS

Description of Area

This report is concerned primarily with the waters of Lake Champlain. The Lake Champlain drainage basin is bounded on the north by the Canadian Border, on the east by Lake Memphremagog and the Connecticut River basin, on the south by the Hudson River basin, and on the west by the St. Lawrence River basin. The maximum length of the Basin is 115 miles from the summit of the Champlain Canal at lock #9 near Fort Edward, New York, north to the Canadian Border. At its greatest width, the Basin reaches 105 miles from the Saranac Lakes in the west to the Winooski River headwaters in the east. From South Bay to the Canadian Border, the boundary line between the States of New York and Vermont lies within Lake Champlain. (See Figure I-1).

Climate

The area around Lake Champlain has long, cold, and snowy winters, relatively short, moderate to hot summers, and transitional seasons of highly variable weather. The average annual air temperature is about 45 degrees Fahrenheit. Temperatures range from below zero in the winter to above 90 in the summer. The annual average precipitation is approximately 37 inches with a maximum of 46 inches and a minimum of 27 inches for the 25 years of record. Generally the precipitation is evenly distributed throughout the year.

Topography

Lake Champlain and its surrounding lowlands are in the Champlain section of the St. Lawrence Valley Physiographic Province, which is a part of the Appalachian Highlands. Lake Champlain is in the northern part of the great trough which extends from New York Harbor to the St. Lawrence River. With the Adirondack Mountains to the west and the Green Mountains to the east, it lies in a low valley which is narrow in the south and gradually widens to approximately 25 miles near the Canadian Border. The surrounding lowlands are characterized by sparse hills and low mountains. Adjacent to the eastern and northwestern shores the land is relatively flat. In the southern part, the western shore is flanked by the rugged Adirondack Mountains, some of which rise out of Lake Champlain.

Geology

The predominant geological features in the immediate vicinity of Lake Champlain are the eastern Adirondack Mountains of New York, and the Champlain Valley of New York and Vermont. Most of the eastern Adirondacks is underlain by metamorphic and igneous rocks of pre-Cambrian age. The northern end of the pre-Cambrian metamorphic core of the Green Mountains crops out near Middlebury, Vermont. The rest of the Basin is underlain by sedimentary and metamorphic rocks of Cambrian and Ordovician age.

The bedrock of the eastern Adirondacks consists mainly of gneisses, feldspars, quartzites, hornblend and crystalline limestone. Commercial deposits of non-titaniferous magnetite, feldspar, wallastonite-garnet, quartz and graphite are present.

The bedrock of the Champlain Valley consists principally of limestone, dolomite, shale and sandstone. In Clinton County, New York, the bedrock is mostly Potsdam Sandstone which has been quarried for building and curb stones. The Chazy and Blackmantown limestones are quarried and used for crushed stone and in the manufacture of lime.

In the Vermont section of the Valley, the limestone, dolomites, shale and sandstones are metamorphosed. Marble quarries are located at Proctor and West Rutland. South of Burlington, limestone is quarried and crushed.

Most of the bedrock is covered by unconsolidated surficial materials consisting of glacial till, aqueo-glacial deposits and alluvium. Glacial till covers much of the upland areas and valley walls. Most major stream valleys have aqueo-glacial deposits, which are a source of commercial sand and gravel. Along Lake Champlain and in a few stream valleys are found deposits of glacial lake clay.

Hydrology

The drainage area of the Lake Champlain basin in the United States is approximately 7,700 square miles. Selected hydrologic characteristics for those tributary streams having a drainage area in excess of 250 square miles are shown below.

Stream	Drainage Area in U.S. (sq. mi.)	Average Annual Flow (cfsm)*	Minimum Daily Flow 1964 WY (cfsm)*	Years of Record	Waterway Length (mi.)
Poultney River	261	2.6	.02	36	39
Otter Creek	941	1.5	.18	48	105
Winooski River	1,065	1.6	.04	36	90
Lamoille River	716	1.8	.11	35	84
Missisquoi River	867	1.9	.13	48	88
Great Chazy River	300	1.1	.06	36	47
Saranac River	614	1.4	.15	48	60
Ausable River	518	1.5	.25	54	55
Bouquet River	278	1.0	.12	41	49
Lake George	262	1.3	.05	22	45

*cfsm - cubic feet per second per square mile

On the basis of the average annual flows in streams tributary to Lake Champlain, the average runoff in the Basin is about 22 inches per year or a little more than 60 percent of the precipitation. Lake Champlain discharges into the Richelieu River which flows northward into the St. Lawrence River.

Hydrography

Lake Champlain is long and narrow, having a length of 107 miles and a maximum width of about 12 miles. The surface area of the Lake and its contained islands is 473 square miles. The longitudinal axis of the Lake is generally in

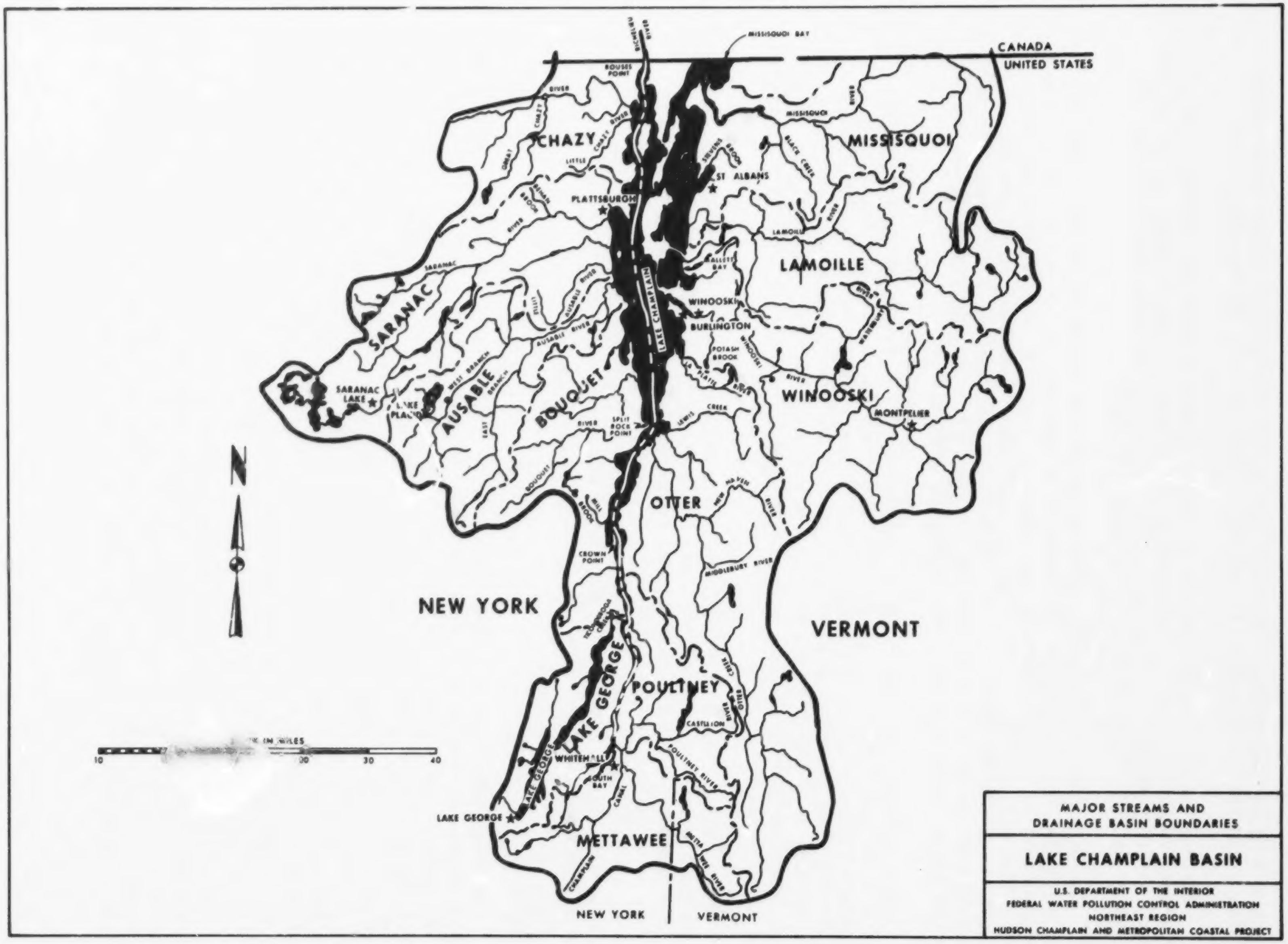

MAJOR STREAMS AND
DRAINAGE BASIN BOUNDARIES
LAKE CHAMPLAIN BASIN
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
NORTHEAST REGION
HUDSON CHAMPLAIN AND METROPOLITAN COASTAL PROJECT
CANADA
UNITED STATES
MISSISQUOI BAY
RICHELIEU RIVER
ROUSES POINT
CHAZY
MISSISQUOI
LAMOILLE
WINOOSKI
SARANAC
AUSABLE
BOUQUET
OTTER
POULTNEY
LAKE GEORGE
METTAWEE
LAKE CHAMPLAIN
ST ALBANS
PLATTSBURGH
WINOOSKI
BURLINGTON
POTASH BROOK
MALLETTS BAY
SPLIT ROCK POINT
LEWIS CREEK
SARANAC LAKE
LAKE PLACID
MONTPELIER
CROWN POINT
MIDDLEBURY RIVER
NEW HAVEN RIVER
MILL BROOK
CASTLETON
WHITEHALL
SOUTH BAY
POULTNEY RIVER
METTAWEE RIVER
CHAMPLAIN CANAL
LAKE GEORGE
NEW YORK
VERMONT
NEW YORK
VERMONT
N
SCALE IN MILES
10
20
30
40

Figure I-1

a north to south direction. The Lake can be classified into three major water bodies: (a) the South Lake; (b) the Main Lake; and (c) the Northeast Arm.

The South Lake is that portion of Lake Champlain from the southern end of South Bay to Crown Point. It comprises approximately five percent of the surface area and 0.5 percent of the volume. This extremely narrow portion of the Lake is shallow, with depths generally less than 25 feet.

The Main Lake extends from Crown Point to the Richelieu River in Canada. It is bounded on the west by the mainland of New York State and on the east by the mainland of Vermont and the west shore of a string of islands extending north from Malletts Bay. This section comprises approximately 60 percent of the surface area and 82 percent of the volume of Lake Champlain. It ranges in depth from 20 feet in the extreme northern and southern ends, to greater than 350 feet in the south central portion near Split Rock Point.

The Northeast Arm lies east of the string of islands that divide the Lake north of Malletts Bay. It consists of three bodies of water; Malletts Bay, Missisquoi Bay and the large open waters between, all of which are virtually separated from the Main Lake. These bodies comprise approximately 35 percent of the surface area and 17 percent of the volume of Lake Champlain. Depths range from less than 20 feet in the north to more than 100 feet in the central portion and in Malletts Bay.

The levels of Lake Champlain are prescribed by order of the International Joint Commission which was originally established by the Boundary Waters Treaty of 1909 between the United States and Great Britain. These levels are maintained at a maximum of 95.5 feet and a minimum of 93.0 feet during the navigational season, April through December, and 92.5 feet for the rest of the year. Lake levels are measured at Rouses Point, New York, and refer to mean sea level and a 1929 datum

Economy

Although Lake Champlain has approximately 500 miles of shoreline, only five widely separated communities with populations greater than 1,000 have developed on the Lake. Burlington, Vermont, with a population of 33,155 and Plattsburgh, New York, with a population of 20,172 are considered the only major urban centers. These cities serve as focal points for much of the commercial, industrial, and cultural activity throughout the drainage basin. An additional 30 communities in the population range 1,000 to 20,000 are dispersed throughout the Basin with the majority located in Vermont. However, since more than one-half of the Basin's inhabitants reside in rural and non-farm areas of less than 1,000 population, the Basin is characterized as primarily rural. Figure I-2 shows the political boundaries and location of selected cities in the Lake Champlain basin.

Based on the most recent government population estimates, the total number of inhabitants in the Lake Champlain drainage basin was 406,300 in 1966 (see Table I-1). This represents an increase of 23,000 or six percent since the last decennial census in 1960. The Basin's most heavily industrialized counties, Chittenden, Vermont (urban center, Burlington) and Clinton, New York (urban center, Plattsburgh) accounted for somewhat more than 70 percent of the population rise recorded for the entire drainage basin. These demographic changes within the Basin point up the increased demand for factory, service, and other technical and professional employment categories which are largely oriented around urban centers.

Population projections, prepared by the New York State Office of Planning Coordination and the Vermont State Planning Office, anticipate that the New York and Vermont sections of the Basin will realize moderately accelerating growth through the eighties and nineties. Based on present population trends, the New York portion of the Basin is expected to reach 191,000 by 1990, an increase of 30 percent over the 1960 level. The Vermont portion of the Basin, which is developing at a markedly faster pace, is expected to reach 346,000 by 1990, an increase of 46 percent over the 1960 level. It is anticipated that population growth in the Basin will take place primarily in and around the urban centers of Burlington, Vermont, and Plattsburgh, New York.

The economy of the Basin has developed substantially because of its natural resources. These resources have been a major factor in supporting the paper, woodworking and mining industries located in the Basin. State and Federal tourist data indicate that there is an accelerating demand for participation in the Basin's aesthetic environment through travel and recreational activities.

An analysis of the employment patterns in the Basin, as shown in Table I-2, shows a relatively well diversified economic mix of manufacturing, trade and service activities. Together, these employment sources account for more than four-fifths of the Basin's covered labor force. In the three year period 1964 to 1967, employment in manufacturing advanced one-third to a record level of 36,000. Nearly all of this growth took place in Vermont. The New York section of the Basin accounts for only 30 percent of all factory workers. Table I-3 contains further data relative to the number of plants and employment for selected industries.

Service industries are third among the fastest growing of the Basin's major economic sectors. About half of the 22,000 people in this expanding sector are involved in activities catering to tourism and recreation through employment in hotels and lodging facilities, amusement and recreation centers. Employment gains at amusement and recreation facilities in Vermont and the results of a special study of recreation in the State illustrate that an accelerating demand for participation in outdoor activities is underway in that section of the Basin. The private and State expansion of recreation and tourist facilities which has been taking place in the New York section of the Basin indicates that a similar trend may be underway there as well.

TABLE I-1

POPULATION GROWTH AND PROJECTIONS, 1960-1990
LAKE CHAMPLAIN DRAINAGE BASIN

STATE AND COUNTY (Percent Within Lake Basin)	1960 Population	1966 Population	Percent Change 1960-1966	1980 Population	Percent Change 1960-1980	1990 Population	Percent Change 1960-1990
NEW YORK STATE (0.9)							
Clinton - (96.7)	70,336	75,426	7.2	91,500	30.1	103,800	47.5
Essex - (90.4)	31,911	31,730	- 0.6	33,500	5.0	35,000	9.7
Franklin - (14.8)	6,601	6,542	- 0.9	6,800	3.0	7,500	13.6
Warren - (13.4)	5,913	6,325	7.0	7,300	23.5	8,200	38.7
Washington - (66.0)	32,000	32,670	2.1	32,700	2.2	36,000	12.5
NEW YORK STATE SUB-TOTAL	146,761	152,693	4.0	171,800	17.1	190,500	29.8
VERMONT STATE (60.7)							
Addison - (98.8)	19,828	20,847	5.1	23,700	19.5	26,700	34.6
Bennington - (3.5)	870	970	11.4	1,100	26.4	1,300	49.4
Caledonia - (12.3)	2,807	2,645	- 5.8	3,300	17.6	3,700	31.8
Chittenden - (100.0)	74,425	85,700	15.1	104,000	39.7	123,000	65.2
Franklin - (100.0)	29,474	28,200	- 4.3	36,000	22.1	41,000	39.1
Grand Isle - (100.0)	2,927	3,200	9.3	3,500	19.6	4,000	36.7
La Moille - (100.0)	11,027	12,100	9.7	13,000	17.9	14,000	27.0
Orange - (12.2)	1,955	2,086	6.7	2,200	12.5	2,400	22.8
Orleans - (22.2)	4,474	4,285	- 4.2	5,300	18.5	6,000	34.1
Rutland - (100.0)	45,890	48,800	6.3	58,000	26.4	67,000	46.0
Washington - (99.9)	42,824	44,755	4.5	50,900	18.9	56,900	32.9
VERMONT STATE SUB-TOTAL	236,501	253,588	7.2	301,000	27.3	346,000	46.3
BASIN TOTAL	383,262	406,281	6.0	471,800	23.1	536,500	40.0

Sources: Population figures for 1960 and 1966: U. S. Bureau of Census, 1960; Current Population Reports, Estimates of the Population of Counties 1966, Series P-25, No. 401; New York State Statistical Yearbook, 1967, New York State Office of Statistical Coordination, 1968; Population Projections for 1980 and 1990: Demographic Projections for New York State Counties, New York State Office of Planning Coordination, 1968; Vermont Population Projections, Vermont Central Planning Office, 1968.

TABLE I-7

DISTRIBUTION OF EMPLOYMENT BY MAJOR ECONOMIC SECTOR, 1967
LAKE CHAMPLAIN DRAINAGE BASIN

Counties in the Lake Champlain Drainage Basin 1/	Employment All Sectors	Agriculture, Forests, Fisheries	Mining	Contract Construction	Manufacturing	Transportation Activities	Retail-Wholesale Trade	Finance, Insurance, Real Estate	Service Activities	Unclassified
NEW YORK										
Percent Employed by Sectors	100.0	0.3	3.5	5.2	35.4	5.2	27.5	3.2	19.5	0.2
Clinton	10,252	30	252	799	2,345	810	3,347	385	2,234	50
Essex	6,496	13	826	216	1,743	220	1,564	230	1,676	8
Franklin	5,923	22	-	232	1,816	294	1,926	230	1,390	13
Washington	8,678	35	29	374	5,195	291	1,778	168	804	4
SUB-TOTAL, 1967	31,349	100	1,107	1,621	11,099	1,615	8,615	1,013	6,104	75
SUB-TOTAL for 1964	28,167	98	1,119	1,027	10,438	1,590	7,848	982	5,045	20
VERMONT										
Percent Employed by Sectors	100.0	0.2	1.4	4.8	35.9	5.6	23.1	5.1	23.5	0.4
Addison	4,356	19	4	129	2,421	249	641	126	966	5
Chittenden	27,441	75	97	1,450	9,013	1,598	6,175	1,319	7,340	74
Franklin	4,436	6	-	116	1,884	282	[illegible]	128	832	14
Grand Isle	480	-	-	35	147	3	62	6	23	-
La Moille	2,414	14	44	100	466	117	645	78	933	17
Orleans	3,634	7	175	155	1,470	134	198	78	742	75
Rutland	13,664	31	315	724	5,330	889	[illegible]	560	2,570	42
Washington	11,941	18	303	601	3,794	583	2,738	1,178	2,663	63
SUB-TOTAL, 1967	68,366	170	938	3,310	24,525	3,825	15,766	3,473	16,069	290
SUB-TOTAL for 1964	51,318	159	742	1,913	16,451	3,461	13,046	3,100	12,269	175
BASIN TOTAL - 1967	99,715	270	2,045	4,931	35,624	5,440	24,381	4,486	22,173	365
BASIN PERCENT OF TOTAL EMPLOYMENT	100.0	0.3	2.1	4.9	35.7	5.5	24.5	4.5	22.2	0.4

1/ Data for four counties, small parts of which fall within the Lake Champlain Drainage Basin, have been omitted because it was estimated that fewer than 15 percent of the inhabitants in each of the counties were in the Lake Champlain Drainage Basin.

Source: U. S. Bureau of the Census, County Business Patterns, 1967. The above data include all wage and salary workers covered by Social Security.

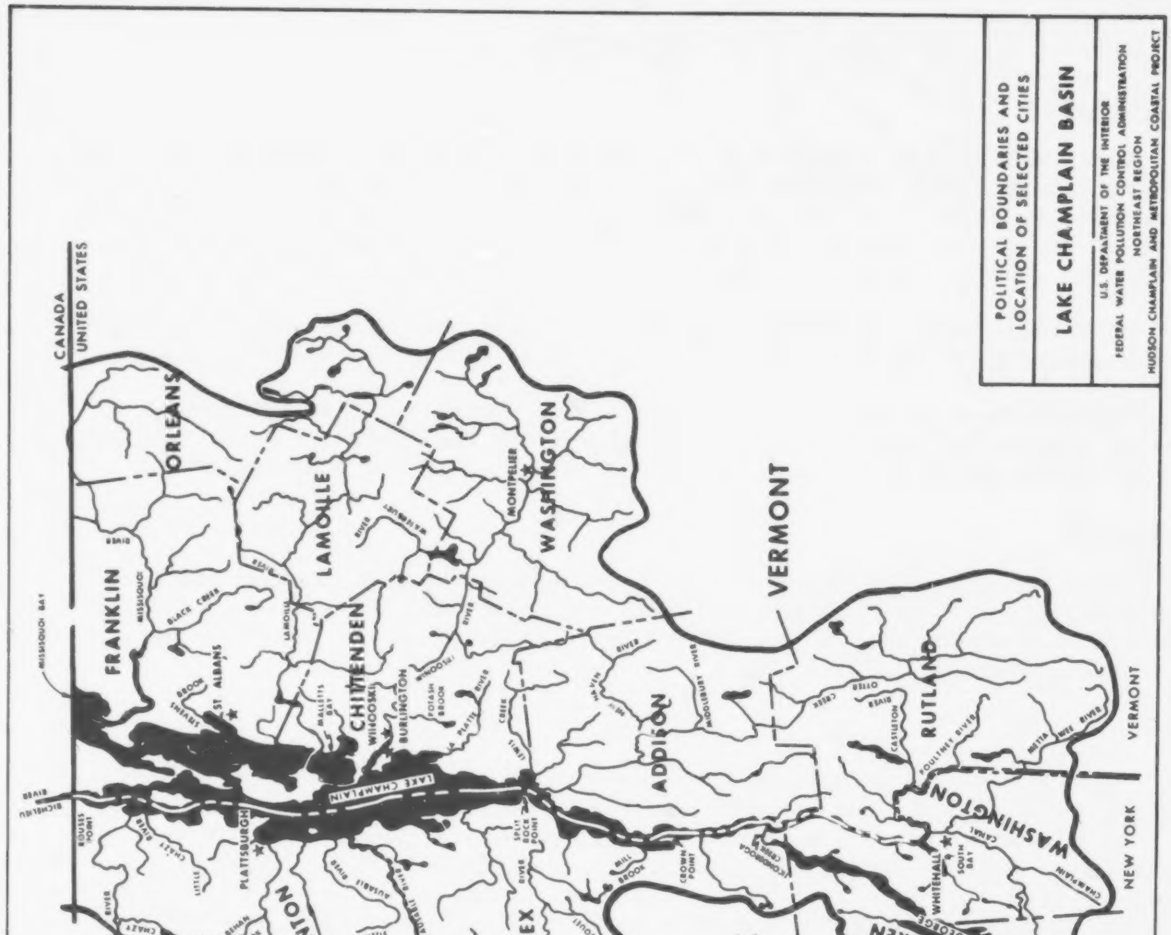
TABLE I-3

DISTRIBUTION OF SELECTED INDUSTRIES,
PLANTS AND EMPLOYMENT, 1967,
LAKE CHAMPLAIN DRAINAGE BASIN

State and County 1/	Total Manufacturing		Food		Textiles		Lumber		Paper		Chemicals		Rubber		Leather		Stone, Clay and Glass		Primary Metals		All Other Manufacturing	
	No. of Plants	No. of Employees	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.	No. of Plants	No. of Emp.
NEW YORK																						
Clinton	51	2,345	9	191	-	-			7	1,141	4	719							-	-	31	294
Essex	53	1,743	-	-	-	-	28	271	2	715	-	-							-	-	23	757
Franklin	63	1,816	15	221	-	-	21	438	-	-	-	-							-	-	19	458
Washington	69	5,195	-	-	-	-	6	101	10	1,207	-	-	1	346	8	699	15	209	-	-	37	3,332
SUB-TOTAL	236	11,099	24	412	-	-	55	810	19	3,063	4	719	1	346	8	699	15	209	-	-	110	4,841
VERMONT																						
Addison	39	2,217	-	-	-	-	19	270	-	-	1	155							-	-	19	1,792
Chittenden	98	9,013	23	491	-	-	11	86	-	-	-	-							1	346	63	8,090
Franklin	38	1,884	10	388	-	-	10	58	2	692	-	-							-	-	16	746
Grand Isle	2	351	-	-	-	-			-	-	-	-							1	346	1	5
La Moille	36	466	-	-	-	-	22	344	-	-	-	-							-	-	14	122
Orleans	31	1,470	6	181	-	-	12	240	-	-	-	-							-	-	13	1,049
Rutland	113	5,330	12	138	-	-	28	459	1	346	4	170					21	676	2	165	45	3,376
Washington	137	3,794	13	201	4	193	18	240	-	-	-	-					70	1,550			32	1,610
SUB-TOTAL	494	24,525	64	1,399	4	193	120	1,697	3	1,038	5	325	-	-	-	-	91	2,226	4	857	203	16,790
BASIN TOTAL	730	35,624	88	1,811	4	193	175	2,507	22	4,101	9	1,044	1	346	8	699	106	2,435	4	857	313	21,631
Industry as a percent of total manufacturing	100.0	100.0	12.1	5.1	0.5	0.5	24.0	7.1	3.0	11.5	1.2	2.9	0.2	1.0	1.1	2.0	14.5	16.8	0.5	2.4	42.9	60.7

1/ Data for four counties, small parts of which fall within the Lake Champlain Drainage Basin, have been omitted because it was estimated that fewer than 15 percent of the inhabitants in each of the counties were in the Lake Champlain Drainage Basin.

Source: U. S. Bureau of the Census, County Business Patterns, 1967. The above data include all wage and salary workers covered by Social Security.


CANADA
UNITED STATES
FRANKLIN
ORLEANS
LAMOILLE
WASHINGTON
MONTPELIER
CHITTENDEN
VERMONT
ADDISON
RUTLAND
WASHINGTON
WARREN
NEW YORK
ESSEX
CLINTON
FRANKLIN
MISSISQUOI BAY
MISSISQUOI
RIVER
BLACK CREEK
ST. ALBANS
LAMOILLE
MALLETTS BAY
WINOOSKI
BURLINGTON
WINOOSKI
RIVER
POTASH BROOK
LA PLATTE RIVER
LEWIS CREEK
OTTER CREEK
NEW HAVEN RIVER
MIDDLEBURY RIVER
CASTLETON RIVER
POULTNEY RIVER
METTAWEE RIVER
CHAMPLAIN CANAL
SOUTH BAY
WHITEHALL
LAKE GEORGE
LAKE GEORGE
TICONDEROGA CREEK
CROWN POINT
MILL BROOK
SPLIT ROCK POINT
BOQUET
LAKE CHAMPLAIN
RICHELIEU RIVER
ROUSES POINT
PLATTSBURGH
LITTLE CHAZY RIVER
GREAT CHAZY RIVER
BEHAN BROOK
SARANAC RIVER
LITTLE AUSABLE RIVER
AUSABLE RIVER
EAST BRANCH
WEST BRANCH
LAKE PLACID
SARANAC LAKE
VERMONT
NEW YORK
N
SCALE IN MILES
10
0
10
20
30
40

POLITICAL BOUNDARIES AND LOCATION OF SELECTED CITIES

LAKE CHAMPLAIN BASIN

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
NORTHEAST REGION
HUDSON CHAMPLAIN AND METROPOLITAN COASTAL PROJECT

Figure I-2

II - WATER USES

Water Supply

Lake Champlain is used as a source of water supply by 14 municipal systems serving approximately 67,000 people. The information on these facilities is summarized in Table II-1. The average total demand of these systems is 6.9 MGD of which Burlington, serving an estimated 50,000 people, requires 4.3 MGD or nearly two-thirds of the entire municipal withdrawal.

An unknown number of private intakes serve the many summer camps and individual homes or groups of homes located along the Lake shore in both States.

Approximately 20 percent or 1.4 MGD of the output of municipal supply systems goes to industries. Available information indicates the self-supplied industrial demand from the Lake is at least as great as the municipal supply.

Recreation

The open waters and shorelines of Lake Champlain are used extensively for recreational activities, primarily during the summer months. These activities contribute significantly to the tourist trade which is one of the important economic activities in the Basin.

Bathing

Bathing beaches and facilities located along the shores of Lake Champlain reflect the demand for this activity in the Lake. There are either State or municipal beaches at Plattsburgh (Cumberland Bay), St. Albans, Chimney Point, Burlington, Westport, Port Henry and at other places as well as numerous privately owned beaches. The State of Vermont estimated that the demand for bathing in its portion of Lake Champlain was 1,470,000 user-days in 1960, and will grow to 2,450,000 user-days by 1976.

Boating

Lake Champlain is extensively used for pleasure boating. Nearly all of the Lake is navigable and access is facilitated by inland navigable waterways. Many cabin cruisers from Albany, New York City, New Jersey, Long Island, Connecticut, the Great Lakes and Canada visit the area during the boating season. There are 18 marinas with a total of over 900 berths distributed evenly between New York and Vermont. In 1966, approximately 7,800 boats were owned in New York counties adjacent to Lake Champlain. Vermont registered approximately 22,000 boats in 1966, half of which were operated on Lake Champlain. The demand for boating activity, including waterskiing, in the Vermont section of the Lake is expected to increase from about 900,000 user-days in 1960 to nearly 1,400,000 user-days by 1976. Approximately 1,500 recreation-type boats used the Champlain Canal to reach the Lake in 1964 and this traffic is expected to reach 5,100 boats by 1980.

Sport Fishing

Sport fishermen are attracted to Lake Champlain by the presence of a wide variety of sport fish. This is true not only for the summer but also in the winter when ice-fishing is popular. Among the more important food and game species are: northern pike, chain pickerel, walleye, largemouth bass, smallmouth bass, yellow perch and smelt. The State of Vermont estimates the demand for this activity will grow to 1,300,000 user-days by 1976.

Waterfowl

Lake Champlain lies on one of three vital waterfowl migration routes in the mid-section of the Atlantic Flyway. The Lake and its immediate adjoining area provide suitable waterfowl habitat. The important state waterfowl management areas in Vermont are the Dead Creek Refuge, Sandbar Refuge, Mud Creek Refuge, Little Otter Creek Refuge and East Creek Refuge. The Missisquoi National Wildlife Refuge is located in Vermont on the Missisquoi River delta. Important waterfowl areas in New York include Ausable Marsh, Wickham Marsh, Kings Bay, Monty's Bay, Scomotion Creek and Bulwagga Bay.

Navigation

The Champlain Canal is an important segment of the New York State Barge Canal System carrying commercial shipping into Lake Champlain.

In 1965 the freight tonnage was 1.27 million tons as recorded at the summit locks (Champlain Canal) with 1,100 vessel trips. Burlington Harbor with 0.55 million tons is the largest harbor on the Lake, receiving some 270 vessel trips in 1965. Nearly all of the freight traffic is shallow-draft tankers and barges transporting petroleum products.

Interest has been expressed in the development of the Champlain waterway to accommodate larger vessels to enhance commercial navigation between the St. Lawrence Seaway and New York Harbor Complex. A study was made in June 1965 by the International Champlain Waterway Board which included a series of public hearings. It was concluded that further development of the waterway is not feasible and no further action is contemplated.

Table II-1

Lake Champlain

Municipal Water Facilities

Facility or Community	Population Served	Plant Capacity (mgd)	Plant Output (mgd)
New York			
Beekmantown Hobbs Subdivision	100	x	x
Essex Essex Water Co.	100	x	.01
Essex J.R. Morse Water Supply	85	x	.01
Plattsburgh Rocky Point Comm. W.S.	175	x	x
Rouses Point	2,400	x	.50
Willsboro Willsboro Bay	170	x	.02
Willsboro Willsboro WD 2	1,715	.66	.17
Vermont			
Alburg	600	.60	.05
Burlington	50,000	8.00	4.26
Grand Isle Grand Isle Water Co.	90	x	.01
Saint Albans	9,000	3.00	1.50
Shelburne	700	.10	.07
South Hero Source 1 & 2	280	.10	.03
Addison, Stareham, Bridgeport Tri-Town	1,400	x	.25

Source of Data - 1963 Public Health Service Inventory.

III - SOURCES OF POLLUTION

The waters of the Lake Champlain Basin receive the discharge of wastes from municipalities, industries, Federal installations, septic tanks and cesspools, commercial and recreational boating, surface runoff and agricultural land drainage.

Municipal Waste

A total of 28 municipal systems serving approximately 115,000 persons discharge wastes which may have a significant effect on the waters of Lake Champlain. Information on these waste sources, which include 16 discharges in New York and 12 in Vermont, is summarized in Table III-1. Figures III-1 and III-2 show the general location of each waste source reported and are keyed to the Table. Of these sources, nine serving 21,000 persons discharge untreated wastes, 18 serving 85,000 persons provide primary treatment, and one serving 9,000 persons provides secondary treatment. Chlorination of the effluent is known to be provided in 17 plants.

Of these 28 systems, seven, serving about 24,000 persons, discharge treated and untreated wastes directly to Lake Champlain. The Burlington, Vermont, (Main Plant) primary treatment facility is the largest of these systems. Westport, New York, serving 700 persons is the only system discharging untreated waste into the Lake.

The remaining 21 systems, which serve approximately 91,000 persons, discharge into tributary waters. Eleven of these systems are located in New York and ten are in Vermont. Of these 21 systems, there is only one secondary treatment plant. This facility, located at St. Albans, Vermont, serves 9,000 persons. Primary treatment is provided at 12 plants serving 62,000 persons. The facility at Plattsburgh, New York, is the largest of these primary systems. The remaining systems, five of which are in New York and three in Vermont, discharge untreated waste from 20,000 persons. The largest of these systems are Whitehall and Ticonderoga in New York, and Winooski and Colchester Fire District No. 1 in Vermont.

Industrial Waste

Industrial wastes are a major pollution problem in Lake Champlain. The wastes from 19 industrial operations, nine in New York and ten in Vermont, affect the waters of the Lake. Three discharge directly to Lake Champlain and the remainder to tributaries. Table III-2 lists and provides information on these waste sources. Figures III-1 and III-2 show the general location of these waste sources.

The total Biochemical Oxygen Demand (BOD) expressed in population equivalents (PE) which is discharged directly to the Lake from industrial operations in New York is estimated to be 180,000. The Lake is also affected by the additional discharge to tributaries of 385,000 PE. Essentially all of this BOD waste load is from pulp and paper plants, which also contain substantial amounts of fibrous suspended solids, as well as refractory organics where chemical pulping is practiced. In addition, an iron ore processing operation discharges inert suspended solids to a tributary.

There are no significant industrial waste discharges directly into the Lake from Vermont. However, an estimated 45,000 PE, of which approximately 30,000 is from one pulp and paper plant, are discharged into tributaries. In addition, substantial amounts of suspended solids enter the Lake from the Poultney River as the result of waste discharges from a number of slate operations.

Industrial waste discharges significantly affect Lake Champlain at two locations —— the Ticonderoga Creek area and Cumberland Bay near Plattsburgh. International Paper Company, Ticonderoga, New York, carries out Kraft pulping, paper making and bleaching, and discharges waste into Ticonderoga Creek about two miles above its confluence with the Lake. At Plattsburgh, New York, two pulp and paper plants, Georgia Pacific Corporation and Diamond National Corporation, discharge wastes directly to Lake Champlain. The Georgia Pacific operation consists of neutral sulfite semi-chemical pulping and papermaking, and Diamond National has mechanical pulping and papermaking. Imperial Paper Company, with mechanical pulping and papermaking, discharges its waste into the Saranac River about two miles above its confluence with the Lake at Plattsburgh. All of these plants discharge substantial amounts of solids and organic material as shown below:

Waste Source	Flow (MGD)	Suspended Solids (lb/day)	Organic Loading as Population Equivalents (PE)	Receiving Water
International Paper Co. Ticonderoga, N. Y.	15.6	28,400	315,000	Ticonderoga Cr.
Georgia Pacific Corp. Plattsburgh, N. Y.	5.5	8,300	160,000	Lake Champlain
Diamond National Corp. Plattsburgh, N. Y.	1.3	6,600	20,000	Lake Champlain
Imperial Paper Co. Plattsburgh, N. Y.	3.0	18,000	15,000	Saranac River

Federal Installations

There are 30 Federal installations located near Lake Champlain. These installations generate a total volume of approximately 0.8 MGD consisting primarily of domestic waste. Of these 30 installations, 15 discharge to municipal systems, 14 provide treatment with final disposal of the effluent to the ground and one (Plattsburgh Air Force Base) discharges to surface waters.

Plattsburgh Air Force Base, Plattsburgh, New York, discharges 0.02 MGD of treated effluent to the Saranac River. This waste, resulting from aircraft washing operations, is discharged after treatment consisting of floatation, floculation, settling, pH adjustment and skimming (see Table III-2).

TABLE III-1

MUNICIPAL WASTE SOURCES
LAKE CHAMPLAIN DRAINAGE BASIN 1/

Map Ident. No.	Waste Source	Estimated Population Served	Type Collection System	Degree of Treatment	FLOW-MGD Design	FLOW-MGD Actual	Est. BOD Loading Discharged 2/ (PE)	Receiving Water
				NEW YORK				
1	Granville	2,700	S	Primary	.35	na	1,760	Mettawee River
2	Whitehall	4,900	[illegible]	None	-	na	4,900	Mettawee River
3	Ticonderoga Village	3,000	S	None	-	na	3,000	Ticonderoga Creek
4	Moriah Sewage District #1	270	S	Primary	.1	.03	180	Lake Champlain
5	Moriah Sewage District #2	2,900	S	Primary	.1	.04	2,320	Lake Champlain
6	Port Henry (Village)	1,800	S	Primary	.4	.16	1,170	Lake Champlain
7	Mineville	1,800	S	Primary	.1	na	1,170	Mill Brook Lake Champlain
8	Glover Hill Housing	900	na	Primary	na	na	550	Mill Brook Lake Champlain
9	Westport	700	S	None	-	na	700	Lake Champlain
10	Willsboro	900	na	None	-	na	900	Bouquet River
11	Keesville	300	na	None	-	na	300	Ausable River
12	Peru Sewage District #1	2,800	S	Primary	.3	.18	1,820	Little Ausable River
13	Plattsburgh	27,000	B	Primary	4.0	3.5	17,550	Saranac River
14	Champlain Park S.D.	1,000	S	Primary	.05	.1	700	Lake Champlain
15	Chazy	600	na	None	na	na	600	Little Chazy River
16	Champlain Village	1,550	S	Primary	.25	.43	1,240	Great Chazy River
17	Rouses Point Village	2,160	B	Primary	.68	.3	1,400	Lake Champlain
				VERMONT				
18	Shelburne Fire District #2	500	S	Primary	.1	.09	774 3/	La Platte River
19	South Burlington (Bartlett Rd.) F.D. #4	2,500	S	Primary	.3	.25	2,900 3/	Potash Brook Shelburne Bay
20	Queen City Park	200	na	Primary	-	.2	130	Potash Brook Shelburne Bay
21	Burlington (Main Plant)	18,400	B	Primary	3.7	3.0	27,900 3/	Lake Champlain
22	South Burlington (Main Plant)	5,600	B	Primary	1.2	.314	1,878 3/	Winooski River
23	Burlington (Riverside)	9,000	B	Primary	1.0	.598	5,860 3/	Winooski River
24	Burlington (North End)	7,000	B	Primary	2.0	1.078	8,910 3/	Winooski River
25	Colchester Fire District #1	2,000	S	None	-	na	2,000	Winooski River
26	Winooski	7,000	B	None	-	.45	7,000	Winooski River
27	St. Albans	9,000	B	Secondary	4.0	4.4	4,000	Stevens Brook St. Albans Bay
28	Alburg	300	S	Primary	.015	.03	240	Lake Champlain
29	Swanton	1,500	B	None	na	na	1,500	Missisquoi River

1/ Includes only those waste discharges affecting the Lake.

2/ Where plant data were not available BOD loading discharged in PE were estimated using a percentage removal for each sewage treatment plant. Waste facilities were credited with 35 percent removal for primary treatment, and 85 percent for secondary treatment. The percentage of PE removal was adjusted for those cases where plants were found to be overloaded.

3/ Treatment plant data. Population equivalent discharged include industrial waste loadings.

S - Separate Collection System
C - Combined Collection System
B - Both Separate and Combined Collection Systems
na - Data not available

TABLE III-[illegible]

INDUSTRIAL WASTE SOURCES
LAKE CHAMPLAIN DRAINAGE BASIN 1/

Map Ident. No.	Industrial Waste Source	Location	Number of Employees	Type of Operation	Est. BOD Loading Discharged (PE) 2/	Treatment	Receiving Water
				NEW YORK			
30	International Paper Co.	Ticonderoga	1150	Pulp and Paper	315,000	Save-all	Ticonderoga Creek
31	Republic Steel Corp.	Port Henry	6	Iron Ore Processing	-	Prim. Clarif. Settling	Bartlett Brook Trib. to Mill Brook
32	Rogers, J & J Co.	Ausable Forks	258	Paper	55,000	Save-all	Ausable River
33	Imperial Paper Co.	Plattsburgh	759	Pulp and Paper	15,000	None	Saranac River
34	Diamond National Corp.	Plattsburgh	377	Pulp and Paper	20,000	Save-all	Lake Champlain
35	Georgia Pacific	Plattsburgh	638	Pulp and Paper	160,000	Save-all	Lake Champlain
36	Plattsburgh Air Force Base	Plattsburgh	-	Aircraft washing	-	Flotation Flocculation & Settling Skimming	Saranac River
37	Champlain Creameries	Champlain	75	Dairy	1,000	None	Great Chazy River
				VERMONT			
38	Fair Haven Mills	Fair Haven	30-49	Spec. Rayon Fibers Chemicals	3-4,000	None	Castleton River Trib. to Poultney R.
39	Vermont Cut Slate	Fair Haven	4	Slate	-	None	Castleton River Trib. to Poultney R.
40	Vermont Structural Slate	Fair Haven	50	Slate	-	None	Castleton River Trib. to Poultney R.
41	Vermont Structural Slate	Hydeville	5-9	Slate	-	None	Castleton River Trib. to Poultney R.
42	Economu Cheese Co.	Hinesburg	50-99	Dairy	3-5,000	None	La Platte River
43	Louis E. Farrell	Burlington	10-19	Soft Drinks	200	None	Lake Champlain
44	John Mc Kenzie Pkg.	Burlington	10	Meat	2,000	Ineffective Septic Tank	Winooski River
45	Milton Co-op Dairy	Milton	50-99	Dairy	1,000	None	La Moille River
46	Missisquoi Specialty Board	Sheldon Springs	270	Pulp and Paper	30,000	Save-all	Missisquoi River
47	Vermont Dressed Beef	Swanton	10-19	Meat	300-1,000	None	Missisquoi River

1/ Includes only those waste discharges affecting the lake.

2/ Population equivalents determined on a BOD basis using an estimated daily per capita loading of 0.17 pounds of BOD per day.

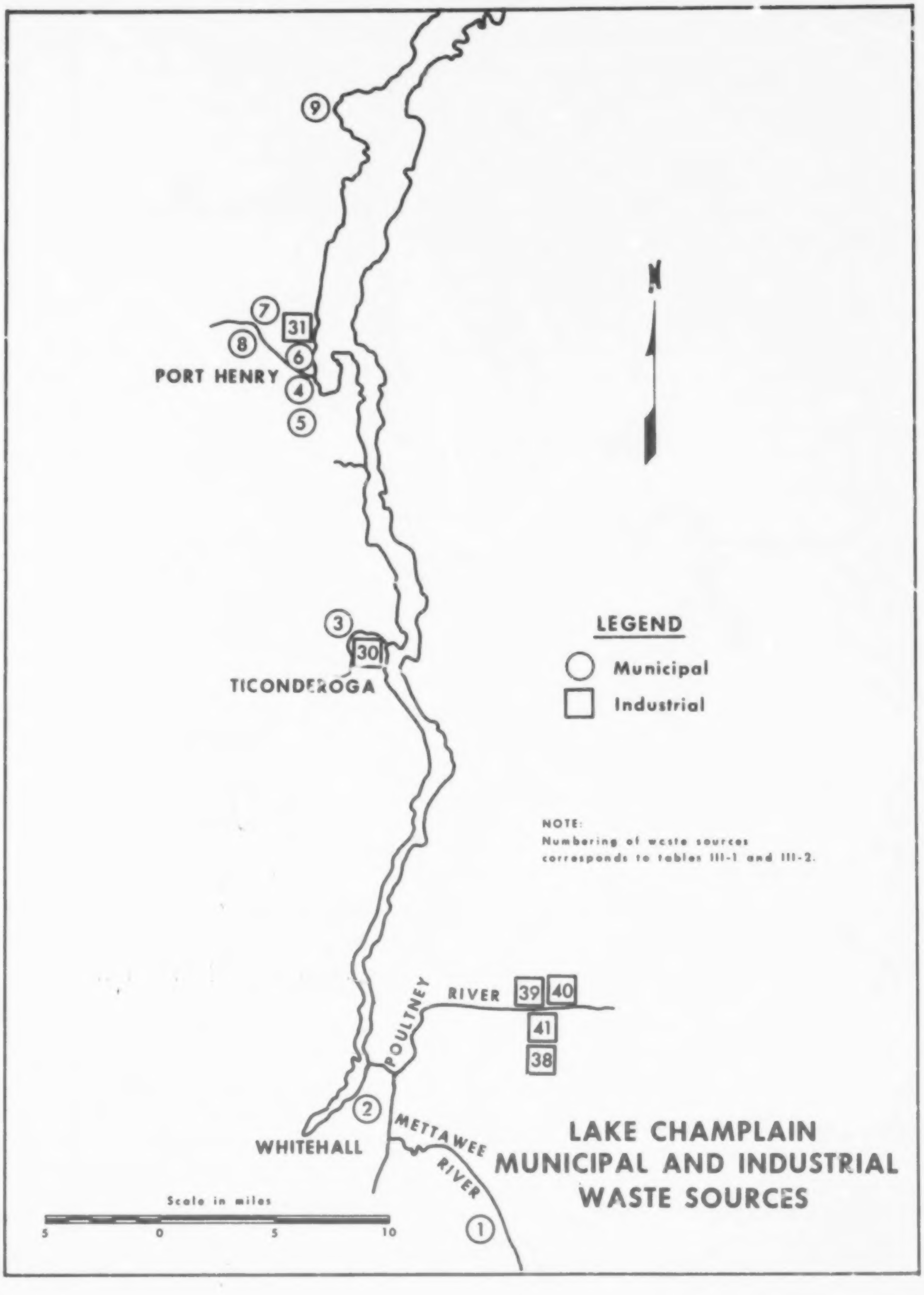

9
7
31
8
6
PORT HENRY
4
5
N
3
30
TICONDEROGA
LEGEND
○ Municipal
☐ Industrial
NOTE:
Numbering of waste sources corresponds to tables III-1 and III-2.
RIVER
39
40
41
38
POULTNEY
2
WHITEHALL
METTAWEE
RIVER
1
Scale in miles
5
0
5
10
LAKE CHAMPLAIN
MUNICIPAL AND INDUSTRIAL
WASTE SOURCES

Figure III-1

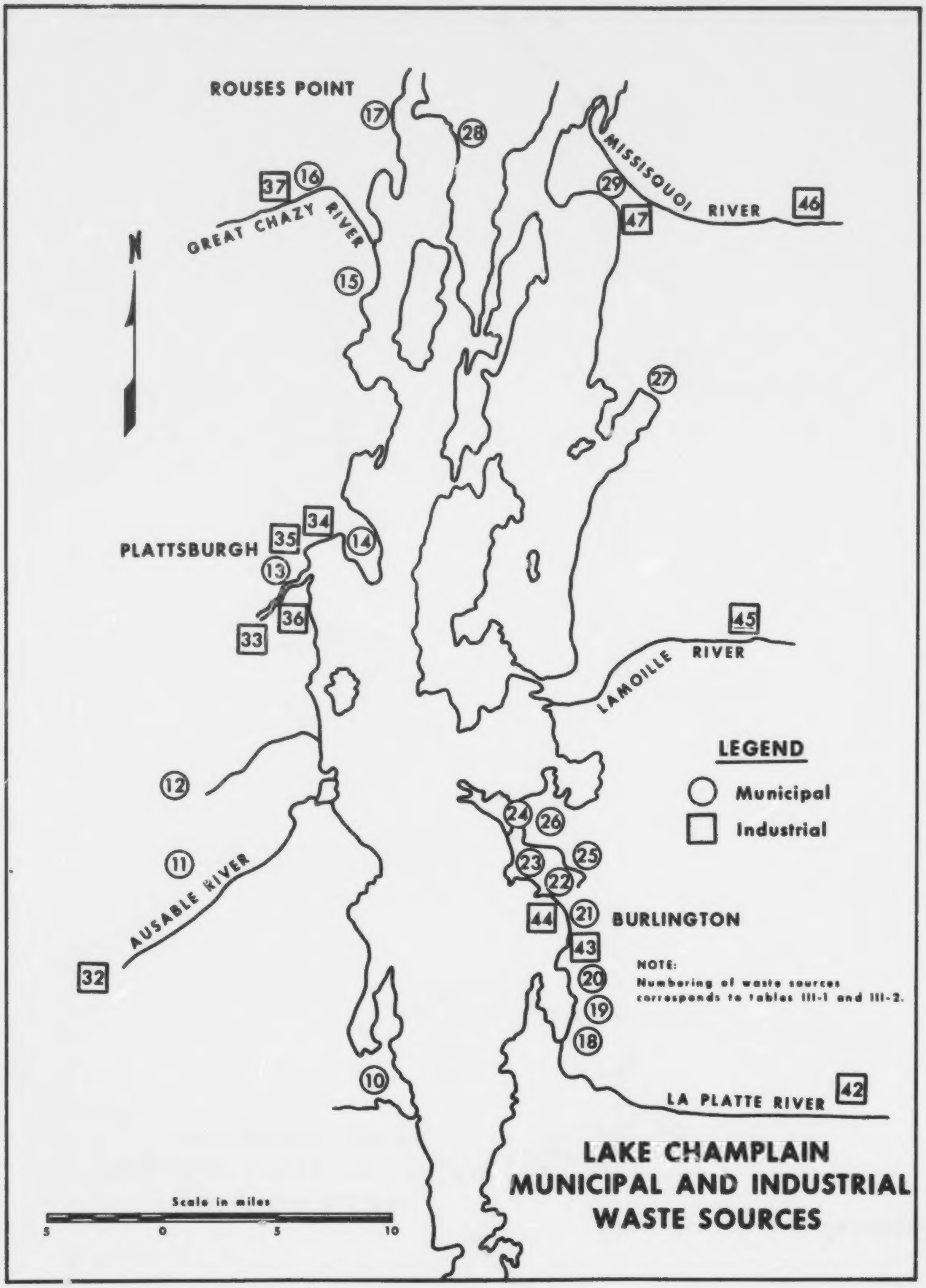

ROUSES POINT
17
28
37
16
GREAT CHAZY RIVER
15
MISSISQUOI RIVER
29
47
46
N
27
PLATTSBURGH
35
34
14
13
36
33
45
LAMOILLE RIVER
LEGEND
Municipal
Industrial
12
24
26
11
23
25
22
AUSABLE RIVER
44
21
BURLINGTON
43
32
NOTE:
Numbering of waste sources corresponds to tables III-1 and III-2.
20
19
18
10
LA PLATTE RIVER
42
LAKE CHAMPLAIN
MUNICIPAL AND INDUSTRIAL
WASTE SOURCES
Scale in miles
5
0
5
10

Figure III-2

Septic Tanks and Cesspools

Many summer camps and private homes located along the shores of Lake Champlain dispose of domestic sanitary waste by individual septic tanks and cesspools. The direct discharge or leaching of pollutants from these systems, particularly bacteria and nutrients, constitutes a source of pollution of the Lake waters.

Stormwater Overflow

Combined stormwater-sanitary sewage collection exists at ten municipal systems. These systems, three in New York and seven in Vermont, serve approximately 92,000 persons. Of these systems, one in New York (Rouses Point) and one in Vermont (Burlington, Main Plant), discharge directly to Lake Champlain waters. The remainder discharge to tributaries. During storm periods, the overflows from these systems can represent a source of untreated sanitary waste. They may contain large amounts of suspended solids, putrescible organic matter and bacteria.

Recreational Boating

The waters of the Lake Champlain Basin, particularly the Lake itself, are widely used for recreational boating. This activity can represent a source of pollution as the result of the discharge of human fecal matter, litter, motor exhaust and oil. The discharge of untreated fecal matter into the Lake and its tributaries may add pathogenic bacteri which would result in a serious health hazard where the water is used for drinking or recreation. Litter causes a deterioration of the aesthetic quality of the environment, particularly where it gathers along the shore line.

Other Pollutional Problems

Water quality is adversely affected by several other sources of pollution. Lake Champlain is periodically polluted by spills of petroleum products from commercial vessels and shore installations. Fifteen such incidents have occurred since 1965, the largest of which involved about 15,000 gallons of jet fuel.

Erosion by surface runoff transports large amounts of soil and natural organic material into water bodies. This material settles to the bottom, creating deposits such as those found in Lake Champlain. The disturbance of the bottom deposits by commercial navigational watercraft results in the re-suspension of muds and debris. This condition has been observed to be of significance in affecting water quality of the southern portion of Lake Champlain where depths are shallow.

IV - WATER QUALITY

A survey was conducted by the Federal Water Pollution Control Administration during the period of August 19-26, 1968, to determine quality in the waters of Lake Champlain. The details describing the survey and the results are summarized in Appendix C. Data compiled by the States of New York and Vermont and the Lake Champlain Study Center of the University of Vermont were used to supplement FWPCA data.

The data were evaluated in terms of parameters established by the water quality standards for these waters. Specific parameters such as temperature, dissolved oxygen, bacteria, suspended solids, nutrients, color and turbidity, which generally characterize water quality and highlight the effects of pollution, are discussed below.

Although specific data were not collected for the interstate tributary waters of the Missisquoi, Poultney and Mettawee Rivers, available information on municipal and industrial waste sources, as well as State water quality data, indicates pollutional problems exist in these waters.

Temperature

Temperature is an important physical parameter since it affects the solubility of dissolved oxygen, rates of chemical and bio-chemical reactions, bacterial growth rates and the growth of biological flora and fauna. The temperature of a water body will depend upon the climate of the area and the water depth. Deep waters usually show a smaller response to climatic change than shallow waters. Waters of deep lakes become thermally stratified. The colder, denser water remains in the bottom while the warm waters cover the surface. These water layers, called the hypolimnion and the epilimnion respectively, are separated by a thermal transitional zone called the thermocline. Circulation between these zones remains limited until climatic conditions are such that a uniform water temperature profile is again established.

The survey by FWPCA in August 1968 indicates that the southern end of Lake Champlain from South Bay to Crown Point was not stratified and had a uniform temperature. In the main body of the Lake, from Crown Point to Rouses Point, stratification was encountered. The epilimnion ranged in depth from 20 to 60 feet and in temperature from 18 to 20 degrees Centigrade. The thermocline ranged in thickness from 10 to 50 feet and the hypolimnion was found to start from 50 to 100 feet below the surface with temperatures of from seven to 11 degrees Centigrade.

The Northeast Arm of the Lake is also stratified but to a lesser extent than the main body of the Lake. The epilimnion was found to be 50 to 60 feet deep with a temperature between 20 to 22 degrees Centigrade. The hypolimnion begins at 80 to 90 feet from the surface and has a temperature of about 15 degrees Centigrade.

Shallow areas of the main Lake and the Northeast Arm were not found to be stratified.

Dissolved Oxygen

Dissolved oxygen (DO) is one of the most significant parameters of water quality. Adequate levels of DO are necessary to support fish and other forms of aquatic life. Organic pollution results in the utilization of DO in the receiving water during stabilization of the waste material by bacteria. Oxygen is transferred from the atmosphere or from the photosynthetic production by aquatic plants to replace the oxygen used up during the decomposition of the organic matter. Where the oxygen demands of organic pollution remove all of the dissolved oxygen, aneorbic conditions exist and the waters become septic and foul smelling, thus creating obnoxious environmental conditions.

Lake Champlain receives the discharge of organic material from a variety of pollutional sources. The discharge of these waste materials into waters with limited dilution or restricted circulation can result in depressed DO concentrations that are less than required for the beneficial use of the waters. The FWPCA sampling program showed that DO levels ranged from a minimum of 1.4 to a maximum of 10.4 milligrams per liter (mg/l). Saturation values ranged from 16 to 107 percent. Dissolved oxygen levels for both surface and deep waters were generally the same, with most stations showing a variation of less than 10 percent. However, several stations in the Northeast Arm and most of those in the Ticonderoga area showed significantly larger DO variations.

Figure IV-1 presents the DO profile of surface stations (five feet deep) from Whitehall to Rouses Point along the State line. Dissolved oxygen levels in the main Lake (Port Henry to Rouses Point) were found in all cases to be greater than 8.0 mg/l. Levels in the southern portion (Whitehall to Port Henry) were somewhat less, with values in the Ticonderoga area depressed to less than 5.0 mg/l, indicating the effect on the Lake of wastes entering from Ticonderoga Creek.

Figure IV-2 illustrates the DO profiles found in the Ticonderoga area from Chipman Point to Five Mile Point. Dissolved oxygen in this area was critically depressed to values less than four mg/l, with a minimum of 1.4 mg/l at Mount Independence Point. A joint survey conducted by the FWPCA and the States of New York and Vermont in August 1966 showed a similar depressed oxygen condition in the Ticonderoga Creek area. Other studies by the Lake Champlain Study Center at the University of Vermont further confirm the depressed oxygen condition in the Ticonderoga area.

A low DO value of 5.8 mg/l in the main Lake occurred at one station in Cumberland Bay, indicating a localized pollutional condition caused by the municipal and industrial waste discharges in the Plattsburgh area. Two deep stations in the Northeast Arm showed DO values of 5.1 and 5.2 mg/l, with percent saturations of 51 and 52, respectively. Both of these samples were collected from the hypolimnion and suggest the effect of decomposition of accumulated organic matter and restricted circulation due to stratification.

Bacteria

Bacteria from human wastes can constitute a major water pollution problem. These organisms enter the waters of Lake Champlain through the discharge of

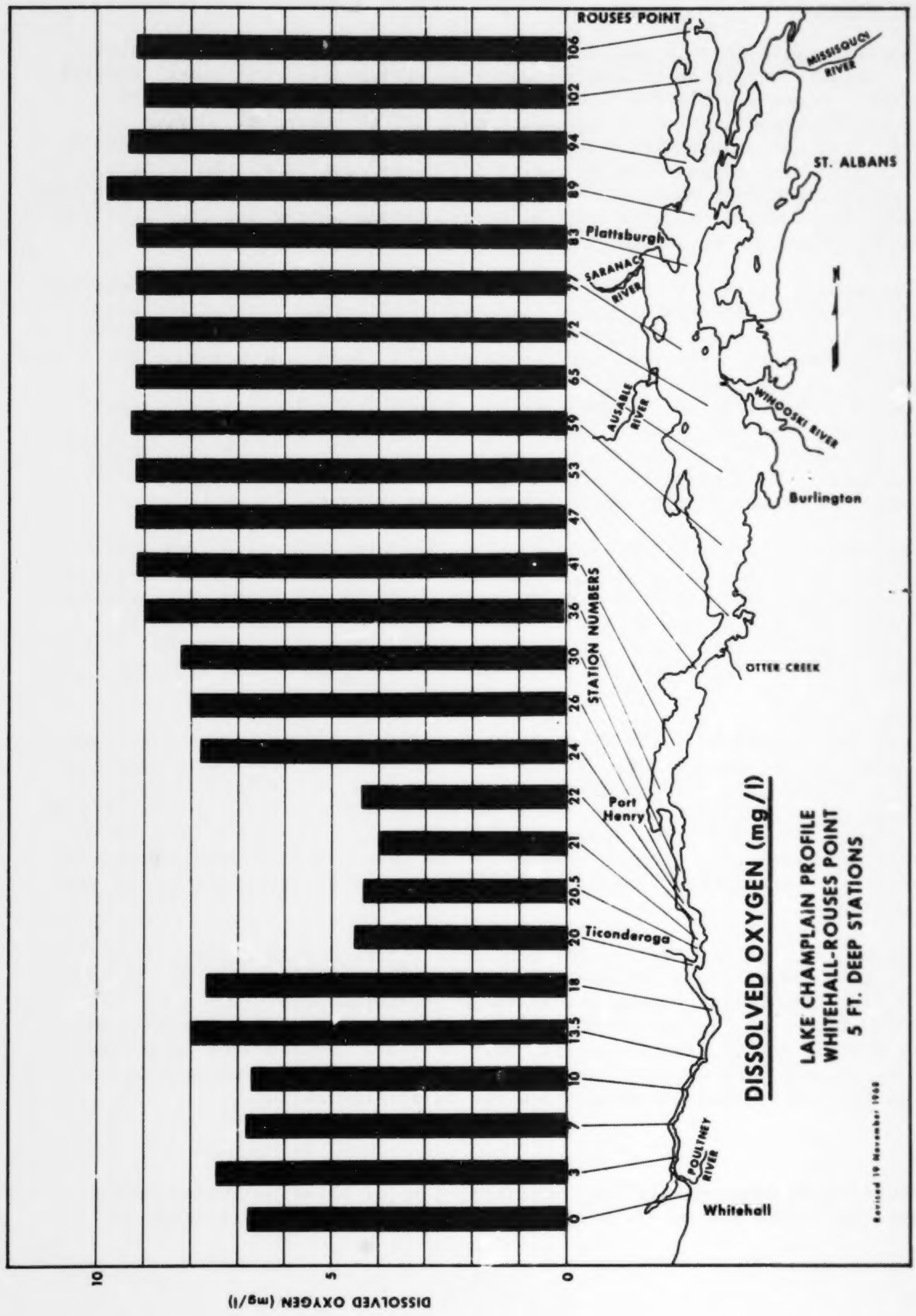

DISSOLVED OXYGEN (mg/l)
LAKE CHAMPLAIN PROFILE
WHITEHALL-ROUSES POINT
5 FT. DEEP STATIONS
Revised 19 November 1968
DISSOLVED OXYGEN (mg/l)
0
5
10
STATION NUMBERS
106
102
94
89
83
77
72
65
59
53
47
41
36
30
26
24
22
21
20.5
20
18
13.5
10
7
3
0
ROUSES POINT
MISSISQUOI RIVER
ST. ALBANS
Plattsburgh
SARANAC RIVER
N
AUSABLE RIVER
WINOOSKI RIVER
Burlington
OTTER CREEK
Port Henry
Ticonderoga
POULTNEY RIVER
Whitehall

Figure IV-1

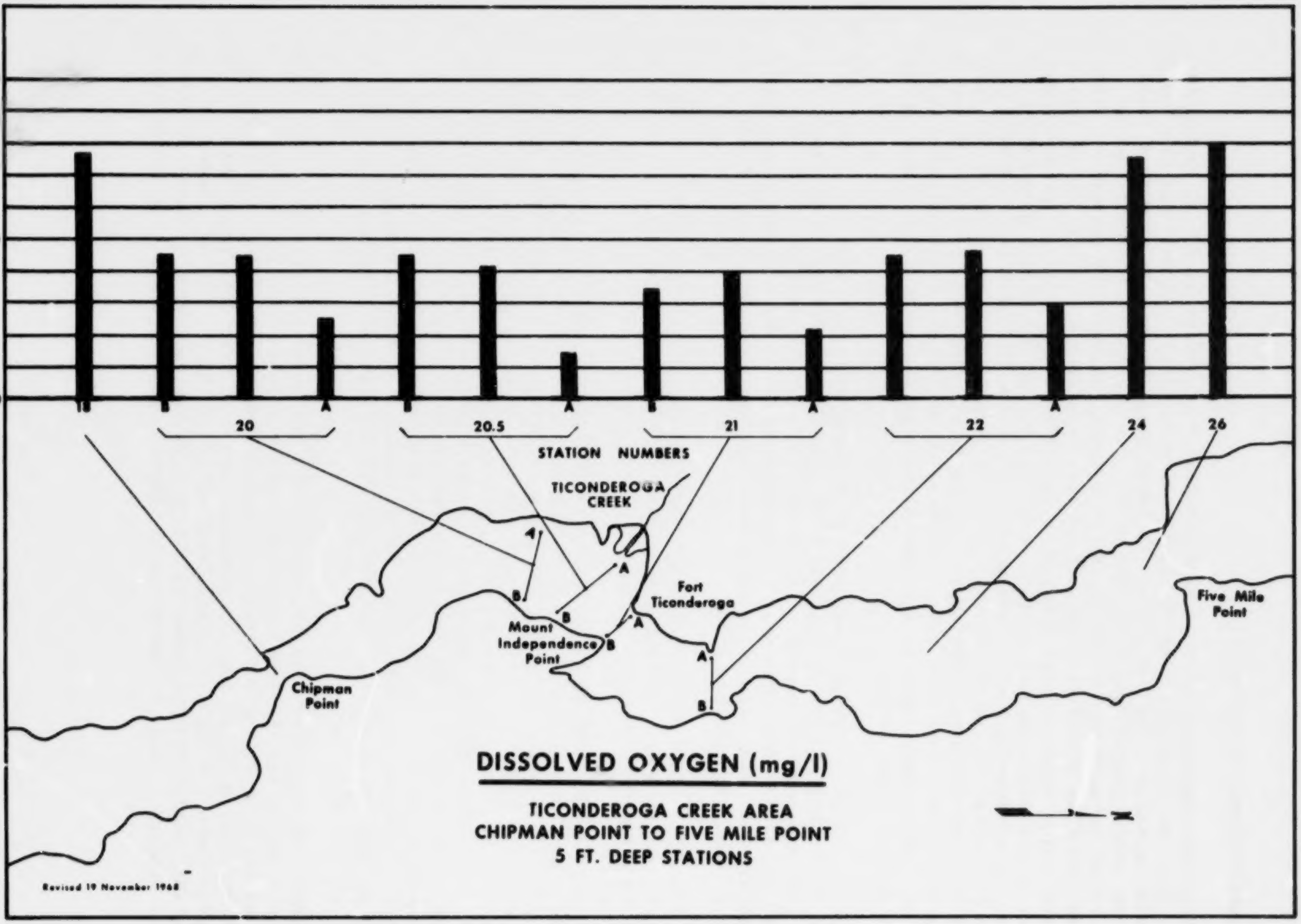

10.0
5.0
0
DISSOLVED OXYGEN (mg/l)
18
B
20
A
B
20.5
A
B
21
A
22
A
24
26
STATION NUMBERS
TICONDEROGA CREEK
Fort Ticonderoga
Mount Independence Point
Chipman Point
Five Mile Point
DISSOLVED OXYGEN (mg/l)
TICONDEROGA CREEK AREA
CHIPMAN POINT TO FIVE MILE POINT
5 FT. DEEP STATIONS
Revised 19 November 1968

Figure IV-2

inadequately treated wastes.

Coliform organisms are used as an indicator to assess bacterial contamination. They can originate from the wastes of warm-blooded animals and are found naturally in soils. The results of the FWPCA sampling program show that total coliform counts ranged from a maximum of 320,000 per 100 ml near Ticonderoga Creek to as low as 8 per 100 ml in the main Lake. Figure IV-3 presents a profile of total coliform densities from surface stations along the State line. Total coliform values south of Port Henry were generally higher than in the main Lake, supporting the water quality pattern developed by the DO profile discussed previously. Exceptionally high levels were found in the Ticonderoga Creek area where values approached 15,000 per 100 ml. A significantly high count of 28,000 per 100 ml was also found near Whitehall. In contrast, coliform levels in the main Lake were in most cases less than 1,000 per 100 ml. Three counts greater than 1,000 per 100 ml were found in the Lake stretch from near the Otter Creek outlet to the Ausable River outlet.

Total coliform counts throughout the Ticonderoga Creek area are shown in Figure IV-4. All samples in the immediate area of Ticonderoga Creek showed a total coliform level in excess of 5,000 per 100 ml. The maximum count of 320,000 per 100 ml was found near the Creek outlet. Data collected during the 1966 survey also show high coliform counts, further confirming the serious bacterial condition in this area.

At certain other areas, such as Cumberland Bay, Port Henry and Westport in New York, and Shelburne and Burlington Bays in Vermont, elevated total coliform levels were found to occur.

Analyses for fecal coliform concentrations, which represent an indication of recent contamination of the environment with feces of warm-blooded animals, were made at all stations during the August 1968 survey. Figure IV-5 shows a fecal coliform profile for the surface stations taken in Lake Champlain along the State line. Fecal counts in the main Lake were generally less than four per 100 ml, suggesting that the high total coliform levels discussed earlier may be the result of natural surface runoff. Significantly higher counts occurred in the Whitehall and Ticonderoga Creek area where fecal coliform levels reached values of 1,800 and 800 per 100 ml, respectively. As shown in Appendix Table C-1, a maximum value of fecal coliform in the Ticonderoga Creek area reached 11,000 per 100 ml.

There are no criteria established by the applicable water quality standards which provide levels for fecal coliform concentrations. Studies on the Ohio River as reported by the National Technical Advisory Committee to the Secretary of the Interior on Water Quality Criteria, indicate that detectable health effects may occur where the fecal coliform level is about 400 per 100 ml. Based upon this study, pollutional problems resulting from contamination by human or animal excreta appear to exist in the areas of Ticonderoga, Whitehall, and in Cumberland Bay.

Suspended Solids

Suspended solids from industries, municipalities and other sources decrease the aesthetic value of the Lake while in suspension and form objectionable bottom deposits on settling. The sludge blanket formed covers and destroys the natural aquatic life on the bottom. The organic matter in the sludge undergoes decomposition which reduces dissolved oxygen in the overlying waters, at times below that needed for survival by fish and other aquatic life. When depletion of oxygen occurs, the further decomposition of organic matter produces obnoxious gases which appear as bubbles on the surface. These gases frequently break loose masses of the deposited sludge and lift them to the surface where they appear as unsightly clumps.

In Lake Champlain, this problem is most significant in the southern section. Slate and quarrying operations on the Poultney River and its tributaries discharge inorganic suspended solids that are essentially inert. These solids affect the stream and ultimately reach Lake Champlain waters. A large pulp and paper plant on Ticonderoga Creek discharges large amounts of suspended solids which enter the Lake. These suspended solids include a large proportion of decomposable organic matter.

Surveys by the FWPCA in August and September 1968 disclosed extensive sludge deposits in Lake Champlain at the mouth of Ticonderoga Creek and in the northwest corner of Cumberland Bay. The sludge delta at Ticonderoga Creek was extensively sampled and the results are summarized in Figure IV-6. In the immediate vicinity of the mouth of the Creek and near the New York shore southwest of the mouth, grey sludge with a fibrous texture and a hydrogen sulfide odor was found. In places, this sludge measured over 12 feet deep. Gas bubbles and floating solids were prevalent on the surface and several masses of sludge were observed coming to the surface. In the deeper waters between the mouth and the New York-Vermont State line, the bottom was a dark ooze with fewer fibers. In water 10 to 20 feet deep, few fibers were found in the ooze and the hydrogen sulfide odor was slight. This bottom was also characteristic of the area between the mouth and the shore north of the Creek. This type of bottom gradually gave way to a soft clay with a slight hydrogen sulfide odor. At points 400 yards south, 800 yards northeast and 600 yards due east of the mouth of the Creek, the tainted bottom gave way to a sand-clay bottom that had no odor. Despite the clean bottom, floating solids were found along the Vermont shore north of Catfish Bay.

Nutrients

Nutrients stimulate the growth of algae and other aquatic plants resulting in the deterioration of water quality. Although over 20 elements are necessary as nutrients for aquatic plant growth, deficiencies in phosphorus and nitrogen are believed to be the most common restraining factors. Municipal waste is a significant source of phosphorus and nitrogen in these waters. Other sources include agricultural runoff and drainage, discharge from boats, percolation from cesspools and septic tanks, industrial wastes, and waterfowl.

There is considerable evidence that low concentrations of phosphate and nitrogen will support algal growth. Levels of phosphate in the range of 0.01

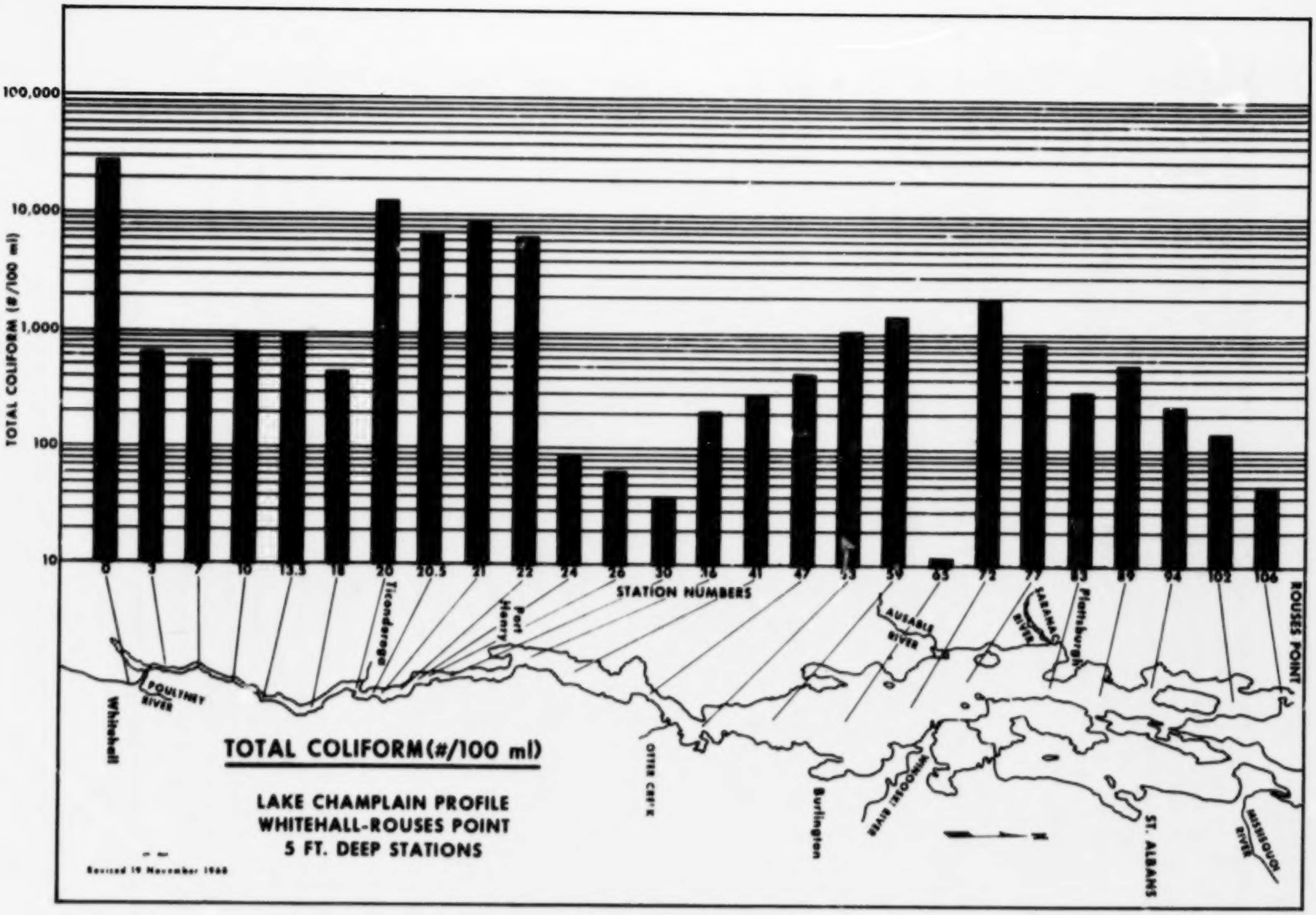
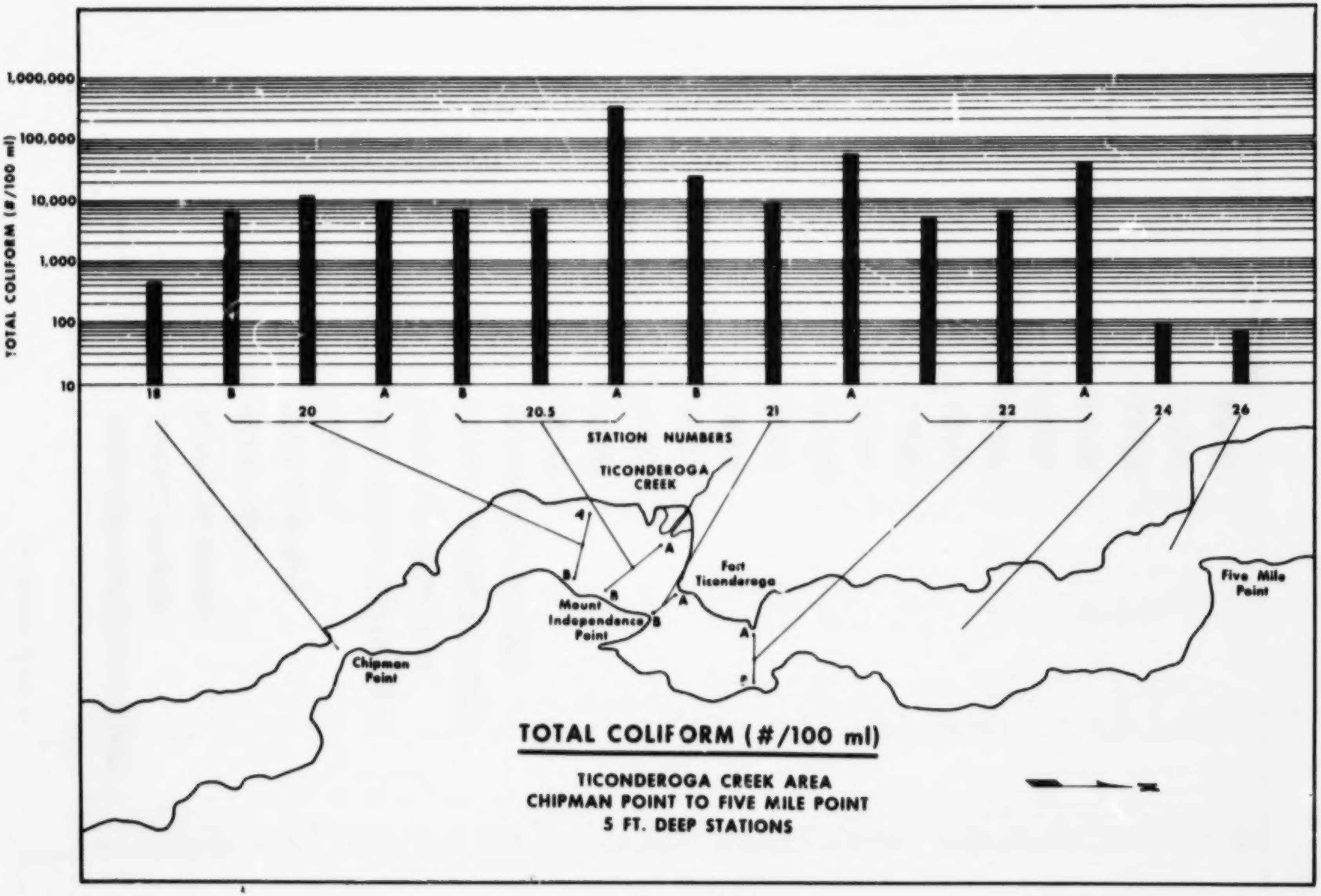

100,000
10,000
1,000
100
10
TOTAL COLIFORM (#/100 ml)
0
3
7
10
13.3
18
20
20.5
21
22
24
26
30
36
41
47
53
59
65
72
77
83
89
94
102
106
STATION NUMBERS
Whitehall
POULTNEY RIVER
Ticonderoga
Port Henry
OTTER CRE'K
AUSABLE RIVER
Burlington
WINOOSKI RIVER
SARANAC RIVER
Plattsburgh
ST. ALBANS
MISSISQUOI RIVER
ROUSES POINT
N
TOTAL COLIFORM(#/100 ml)
LAKE CHAMPLAIN PROFILE
WHITEHALL-ROUSES POINT
5 FT. DEEP STATIONS
Revised 19 November 1968

Figure IV-3



TOTAL COLIFORM (#/100 ml)

TICONDEROGA CREEK AREA
CHIPMAN POINT TO FIVE MILE POINT
5 FT. DEEP STATIONS

Figure IV-4

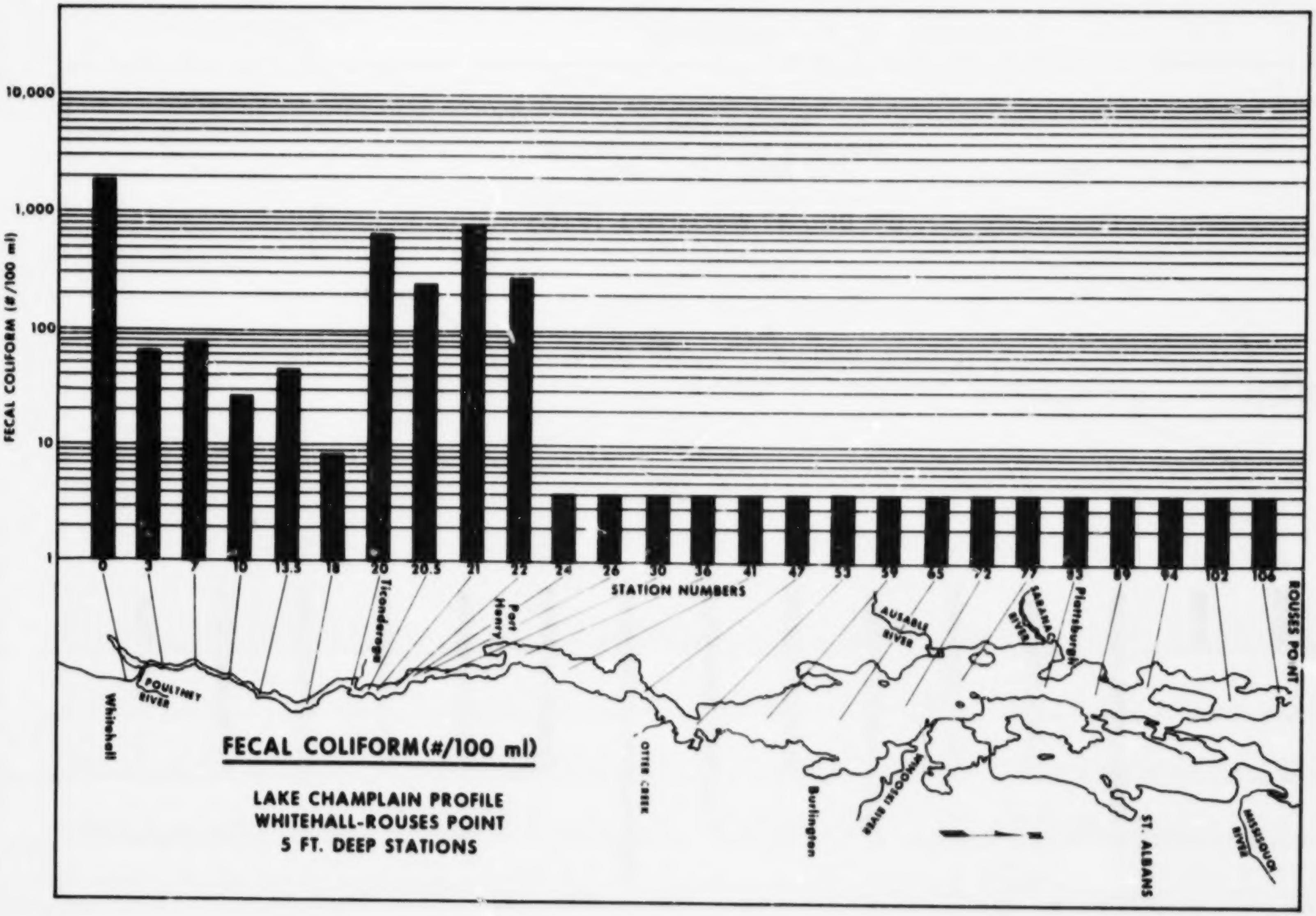

FECAL COLIFORM(#/100 ml)
LAKE CHAMPLAIN PROFILE
WHITEHALL-ROUSES POINT
5 FT. DEEP STATIONS
FECAL COLIFORM (#/100 ml)
10,000
1,000
100
10
1
STATION NUMBERS
0
3
7
10
13.5
18
20
20.5
21
22
24
26
30
36
41
47
53
59
65
72
77
83
89
94
102
106
Whitehall
POULTNEY RIVER
Ticonderoga
Port Henry
OTTER CREEK
Burlington
WINOOSKI RIVER
AUSABLE RIVER
SARANAC RIVER
Plattsburgh
ST. ALBANS
MISSISQUOI RIVER
ROUSES POINT

Figure IV-5

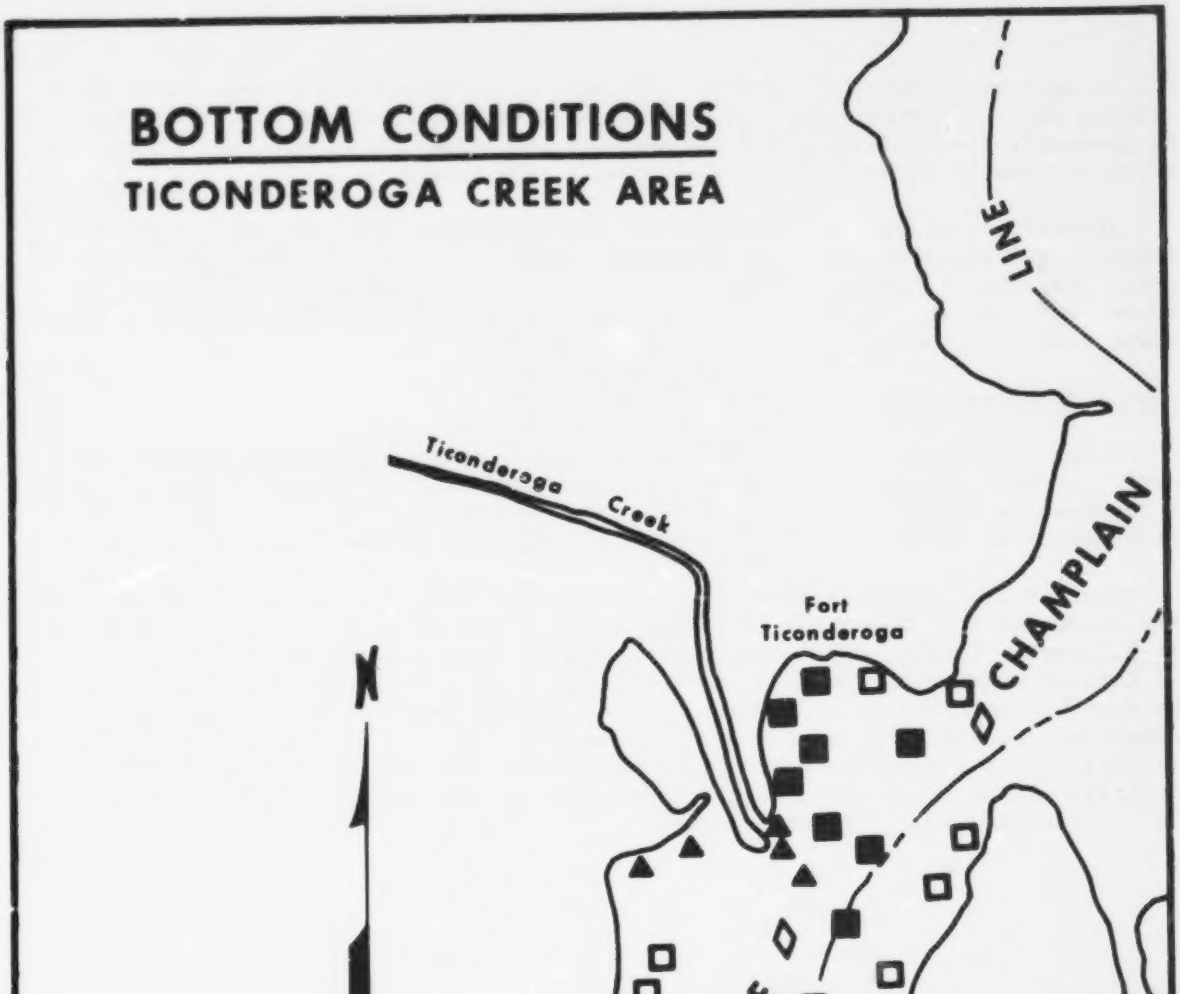

BOTTOM CONDITIONS
TICONDEROGA CREEK AREA
Ticonderoga Creek
Fort Ticonderoga
LAKE CHAMPLAIN
Catfish Bay
NEW YORK
VERMONT
STATE LINE
N
LEGEND
▲ Fibre mat
■ Ooze
◇ Soft clay with odor
□ Clean clay
Scale (miles)
0
½
1

Figure IV-6

to 0.04 mg/l as phosphorus (0.03 to 0.12 mg/l as phosphate) have been reported as being able to support prolific growths of both suspended and attached algae. The generally accepted value for the minimum concentration of nitrogen required for algal growths in fresh water is 0.3 mg/l as nitrogen.

Results of the FWPCA study show that although most stations had values of phosphate and nitrogen above the critical levels, algal blooms were not encountered. Attached filamentous algae and rooted aquatic plants were limited to a narrow band near the shore. St. Albans Bay, Vermont, is one area where a significant algal problem exists.

Color and Transparency

Color in surface waters may be the result of natural phenomena such as land runoff, or may originate from industrial or other waste discharges. Transparency, as recorded by Secchi disc readings, is a measure of the clarity of water. Transparency is affected by the presence of suspended solids and color.

Figures IV-7 and IV-8 show the color and transparency, respectively, of Lake Champlain from Whitehall to Rouses Point. Both profiles emphasize the drastic difference between the southern part and the main body of the Lake. Principal factors which contribute to the increased color and reduced transparency in the southern part are: (a) resuspension of settled material by the passage of commercial vessels because of the shallow depth; (b) suspended solids and color discharged from a large pulp and paper mill to Ticonderoga Creek; and (c) the discharge of inert suspended solids from slate and quarrying operations along the Poultney River and its tributaries.

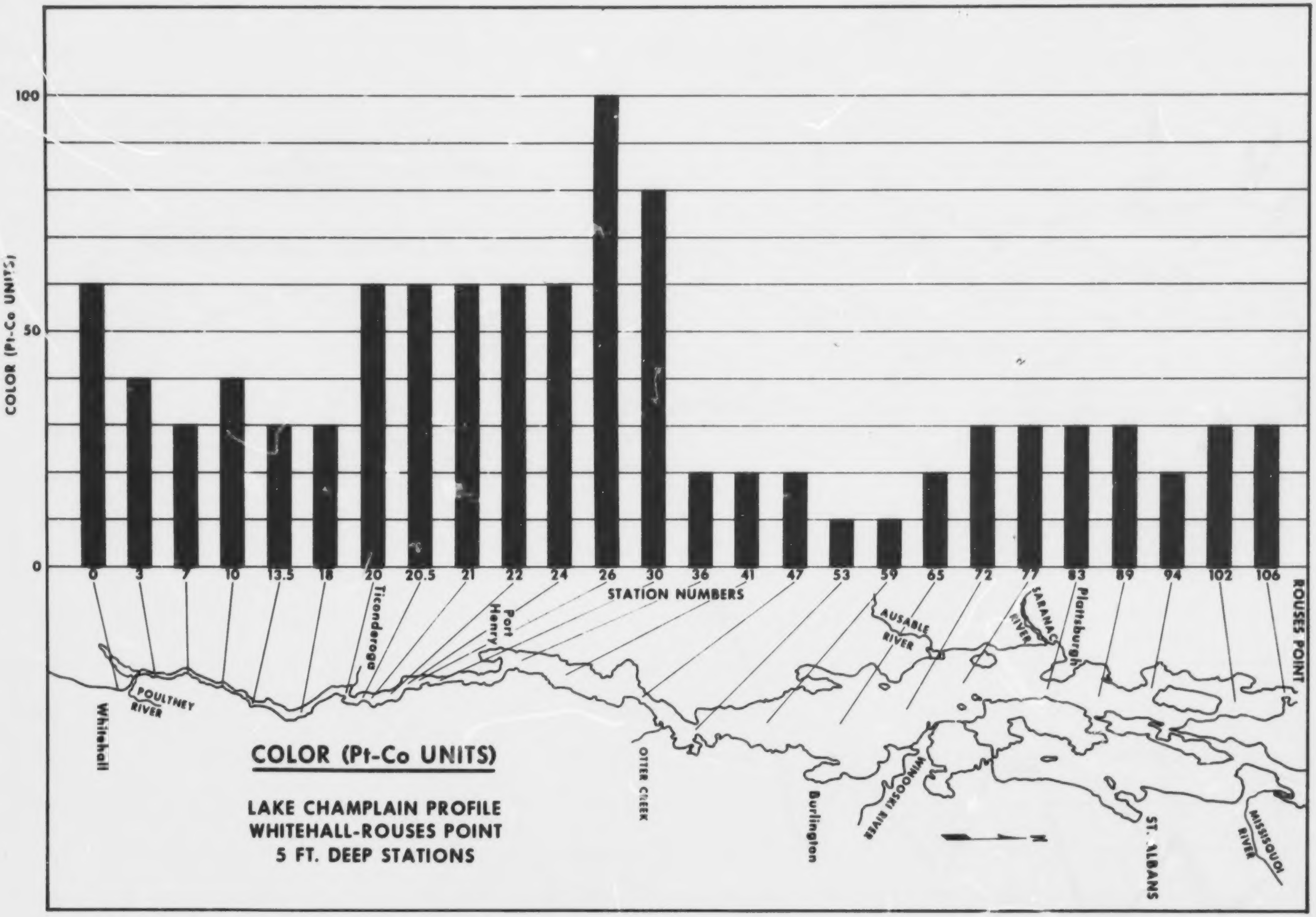

COLOR (Pt-Co UNITS)
LAKE CHAMPLAIN PROFILE
WHITEHALL-ROUSES POINT
5 FT. DEEP STATIONS
COLOR (Pt-Co UNITS)
100
50
0
STATION NUMBERS
0
3
7
10
13.5
18
20
20.5
21
22
24
26
30
36
41
47
53
59
65
72
77
83
89
94
102
106
Whitehall
POULTNEY RIVER
Ticonderoga
Port Henry
OTTER CREEK
Burlington
AUSABLE RIVER
WINOOSKI RIVER
SARANAC RIVER
Plattsburgh
ST. ALBANS
MISSISQUOI RIVER
ROUSES POINT
N

Figure IV-7

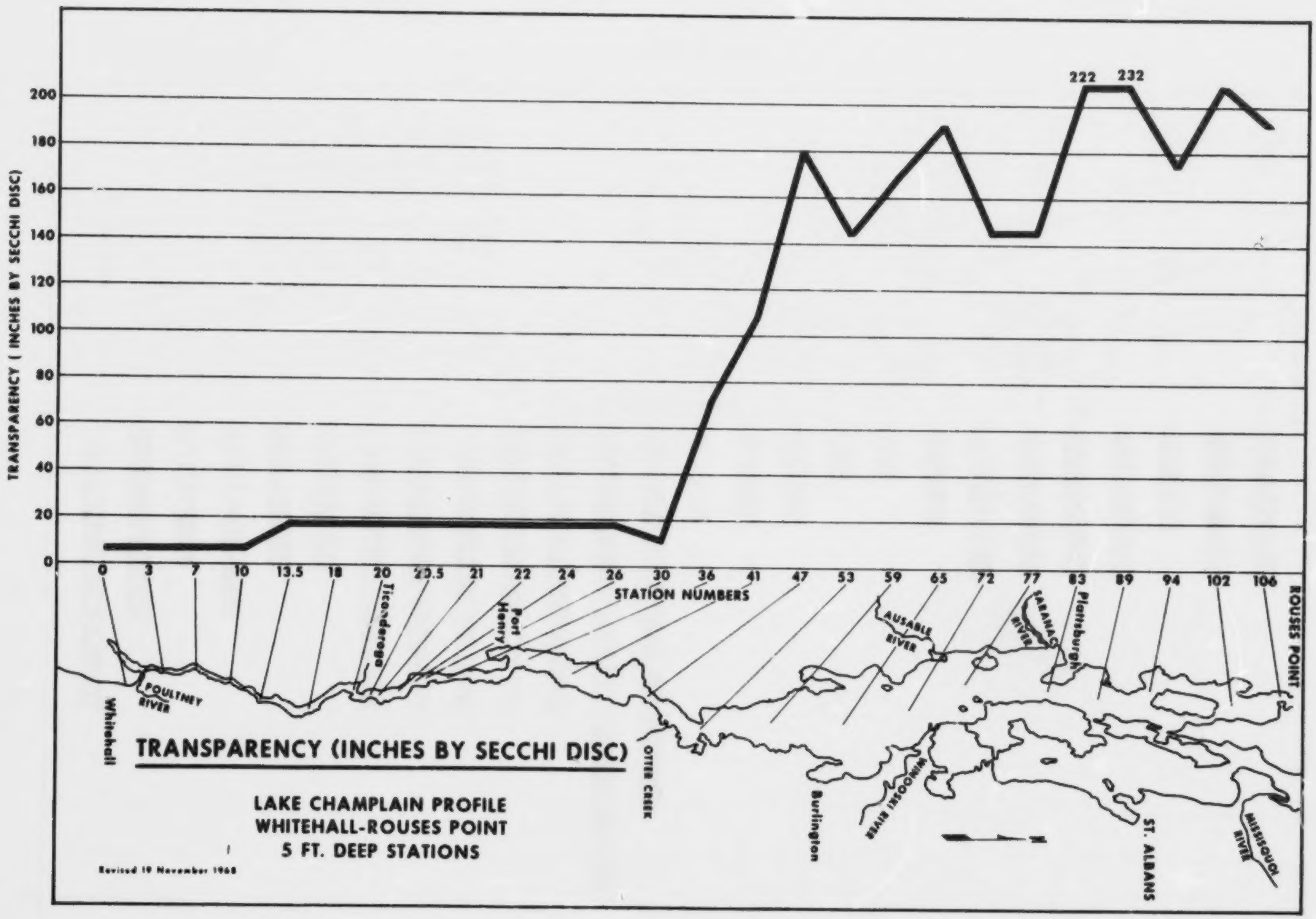

TRANSPARENCY (INCHES BY SECCHI DISC)
200
180
160
140
120
100
80
60
40
20
0
222
232
0
3
7
10
13.5
18
20
20.5
21
22
24
26
30
36
41
47
53
59
65
72
77
83
89
94
102
106
STATION NUMBERS
Whitehall
POULTNEY RIVER
Ticonderoga
Port Henry
OTTER CREEK
Burlington
WINOOSKI RIVER
AUSABLE RIVER
SARANAC RIVER
Plattsburgh
ST. ALBANS
MISSISQUOI RIVER
ROUSES POINT
N
TRANSPARENCY (INCHES BY SECCHI DISC)
LAKE CHAMPLAIN PROFILE
WHITEHALL-ROUSES POINT
5 FT. DEEP STATIONS
Revised 19 November 1968

Figure IV-8

V - POLLUTION CONTROL PROGRAMS

State Programs

The Water Quality Act of 1965 amended the Federal Water Pollution Control Act and provided for the establishment of water quality standards for interstate waters. Under the provisions of the Act, the States were given the option of setting water quality standards by June 30, 1967, for interstate waters or portions thereof within their borders. The standards established had to be consistent with the purposes of the Act which are "...to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution."

The Act provides that the standards adopted by the States must include water quality criteria applicable to the interstate waters or portions thereof within the State, and a plan for the implementation and enforcement of the water quality criteria adopted. The Act further provides that the standards of quality adopted shall be such as to protect the public health or welfare, enhance the quality of the water and serve the purposes of the Act. In establishing such standards on interstate waters, consideration was to be given to their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

The criteria and implementation plans adopted by the States are subject to approval by the Secretary of the Interior. If the Secretary determines that these are consistent with the provisions of the Act, they become the water quality standards applicable to those interstate waters.

New York

The New York Water Pollution Control Act of 1949 established a program of stream classifications for designated waters of the State. After a series of public hearings in August 1955, the State adopted water quality standards for the Lake Champlain drainage basin. In response to the Federal Water Quality Act of 1965, New York was one of the first States in the nation to secure approval from the Federal government of quality standards for interstate waters. Appendix A presents the classifications and water quality criteria for Lake Champlain and its interstate tributaries submitted to the Secretary of the Interior by New York State. Table A-1 summarizes the water pollution abatement schedule for waste sources as established by New York State in order to achieve compliance with the standards. According to this schedule, the industrial polluters under orders will complete remedial facilities by July 1970. Those municipal sources which are under orders will have facilities completed during 1970. Three municipalities have voluntary compliance schedules to provide remedial facilities by April 1972.

Vermont

The State of Vermont passed basic legislation on water pollution control in 1949. Since the enactment of this legislation, the State has completed classification of waters in approximately 40 percent of its land area. In response to the Federal Water Quality Act of 1965, Vermont recently received Federal approval of water quality standards (with exceptions) for interstate waters. The exceptions did not refer to the classification of waters in the Lake Champlain drainage basin but did refer to the criteria established for certain classifications. Appendix B presents the classifications and water quality criteria for Lake Champlain and its interstate tributaries submitted to the Secretary of the Interior by the State of Vermont. Table B-1 summarizes the water pollution abatement schedule for waste sources as established by Vermont in order to achieve compliance with the standards. According to this schedule, industrial polluters are under orders to complete remedial facilities by December 1968. Municipalities which are under orders will have facilities completed by September 1970, with the exception of one source, which is scheduled for completion by June 1971.

General

Comparison of the best usage and the specific criteria for adjacent classified waters of the respective States reveals some differences. The water quality standards accepted for the waters of Lake Champlain range from a "B" in Vermont to "AA" through "C" in New York. New York State held a hearing on October 9, 1968, to consider the reclassification of its waters of lower Lake Champlain from "C" to "B". Should this proposed reclassification become effective, only a small portion of Lake Champlain (Deep Bay) would remain as a "C".

In the main body of the Lake, the Vermont "B" includes such water uses as bathing and public water supply with appropriate treatment while the New York "AA" uses include water supply for drinking, culinary or food processing purposes. In the lower portion of the Lake, the Vermont "B" is as previously defined, the present New York "C" is for fishing and the proposed reclassification to "B" would provide for bathing and any other usage except as a source of water supply. Differences also exist in specific criteria for these classifications, particularly dissolved oxygen, coliform density and temperature.

Interstate Program

Both New York and Vermont are signatory members of the New England Interstate Water Pollution Control Commission, which coordinates the water pollution control activities of the member states. The Technical Advisory Board of the Commission furthers the technical aspects of the program by the exchange of information as well as through the mechanism of research contracts. Of particular note with respect to this latter operation are research studies on the problems of paper, textile, and other wastes conducted under contract with the Commission. New York State's role in the Commission is limited to waters shared jointly by New York and the New England States, e.g., Lake Champlain.

A quasi-official interstate body, INCOCHAMP (Interstate Commission on the Champlain Basin) has operated in the past to bring together resource management personnel from New York and Vermont to plan orderly development of the land and water resources of the Champlain basin. Although no official compact was created to authorize this agency, both States have had tentative statutory approval to create the Lake Champlain Basin Compact. Once established, this compact will serve as a formal planning authority charged with the responsibility of planning land and water resources within the Basin including such activities as water pollution control.

Construction Grant Program

In the Lake Champlain drainage basin to date, the Federal Water Pollution Control Administration has spent or allocated about $7.9 million of the area's total waste facilities construction cost of $26.1 million. This includes 12 projects in New York with a $0.95 million FWPCA allocation and $5.7 million total construction costs, and 36 projects in Vermont with a $6.98 million FWPCA allocation and $20.4 million total construction costs. Table V-1 lists these projects.

TABLE V-1

FEDERAL GRANTS FOR THE CONSTRUCTION OF SEWAGE TREATMENT WORKS

LAKE CHAMPLAIN BASIN

NEW YORK

Name of Project	Proj. No.	Eligible Costs	Amount of Grant	Date of Grant	Description of Project *	Status**
Bolton Landing (T)	WPC-NY-14	$362,800	$ 108,839	4-59	STP, INT, PS, FM	3
Rouses Point (V)	WPC-NY-27	426,900	128,058	4-57	STP, OS, INT, PS, FM	3
Plattsburgh (C)	WPC-NY-124	14,300	4,278	8-61	STP (A)	3
Plattsburgh (C)	WPC-NY-127	46,900	14,053	8-61	STP (A), Trunk Sewer	3
Champlain (V)	WPC-NY-139	312,900	93,892	12-61	STP, INT	3
Dannemora (V)	WPC-NY-153	167,900	50,384	12-61	STP, INT	3
Port Henry (V)	APW-NY-180	334,900	162,500 (APW)	6-63	STP, PS, FM, INT	3
Lake George (V)	APW-NY-194	291,000	145,500 (APW)	1-64	STP (A)	3
Lake George (T)	WPC-NY-284	590,300	177,090	5-66	INT, PS, FM	2
Keeseville (V)	WPC-NY-353	660,300	35,000	4-67	STP, INT, FM, PS	1
Lake Placid (V)	WPC-NY-442	1,407,000	15,470	4-68	INT, PS, STP, (A)	1
Saranac Lake (V)	WPC-NY-443	1,081,300	11,890	4-68	INT, PS, STP (A)	1
TOTALS - New York	12 Projects	$5,696,500	$946,954			

TABLE V-1

LAKE CHAMPLAIN BASIN (Cont'd)

VERMONT

Name of Project	Proj. No.	Eligible Costs	Amount of Grant	Date of Grant	Description of Project *	Status**
S. Burlington F. D. #4	WPC-Vt-1	$124,400	$ 37,307	2-57	STP, OS (A)	3
Burlington (C)	WPC-Vt-2	613,400	184,033	3-57	STP, INT	3
Barre (C)	WPC-Vt-4	522,000	156,588	4-58	STP, OS, INT	3
St. Albans (C)	WPC-Vt-6	668,800	200,641	9-58	STP (A)	3
Shelburne (T)	WPC-Vt-7	54,000	16,200	12-58	STP	3
Brandon (T)	WPC-Vt-10	698,500	209,540	7-59	STP, OS, INT	3
Rutland (C)	WPC-Vt-11	989,000	250,000	1-60	STP, OS, INT	3
Proctor (V)	WPC-Vt-13	506,800	152,027	1-60	STP, OS, INT	3
Essex Junction (V)	WPC-Vt-15	429,900	128,970	6-61	STP, OS, INT	3
Vermont Teachers Coll.	WPC-Vt-16	30,000	8,512	7-61	STP	3
Burlington (C)	WPC-Vt-17	51,600	15,487	12-61	INT	3
Burlington (C)	WPC-Vt-18	616,600	184,982	12-61	STP, INT	3
Montpelier (C)	WPC-Vt-19	1,839,200	551,763	9-62	STP, INT	3
Barre (T)	WPC-Vt-22	807,300	242,201	2-63	STP, INT (A)	3
Newport (C)	APW-WPC-Vt-24	1,584,900	78,268 (WPC) 714,182 (APW)	5-65	STP, INT (A)	3
Vergennes (C)	WPC-Vt-27	477,900	143,367	6-63	STP, OS, INT	3

TABLE V-1

LAKE CHAMPLAIN BASIN (Cont'd)

VERMONT (Cont'd)

Name of Project	Proj. No.	Eligible Costs	Amount of Grant	Date of Grant	Description of Project *	Status**
Middlebury (V)	WPC-Vt-29	$1,051,700	$315,510	12-63	STP, INT (A)	2
Northfield (V)	WPC-Vt-30	1,360,500	408,135	3-64	STP, INT	3
Vermont Bldgs Division	WPC-Vt-31	20,700	6,209	9-64	STP (A)	3
Minooski (C)	WPC-Vt-32	900,000	270,000	11-64	STP, INT	1
Rutland (T)	WPC-Vt-33	109,300	32,788	12-64	STP, INT	3
Berlin (T)	WPC-Vt-34	525,900	157,781	2-65	STP, INT (A)	3
Rutland (C)	WPC-Vt-36	102,800	30,830	5-65	INT (A)	3
Burlington (C)	WPC-Vt-39	68,300	20,502	6-65	INT (A)	3
S. Burlington (T)	WPC-Vt-40	1,540,000	508,198	8-65	STP, OS, INT	3
Essex Junction (V)	WPC-Vt-41	28,600	8,565	10-65	INT	3
Pittsford (T)	WPC-Vt-42	238,000	71,400	2-66	STP, INT	2
Barre (C)	WPC-Vt-44	110,100	33,018	3-66	INT (A)	3
Hinesburg (T)	WPC-Vt-45	610,700	244,300	4-66	STP	2
Waterbury (V)	WPC-Vt-46	634,600	253,840	5-66	STP, INT	2
Vermont State Coll.	WPC-Vt-47	284,900	85,470	10-66	INT (A)	2
Plainfield (V)	WPC-Vt-48	416,800	166,730	5-67	STP, INT	2

TABLE V-1

LAKE CHAMPLAIN BASIN (Cont'd)

VERMONT (Cont'd)

Name of Project	Proj. No.	Eligible Costs	Amount of Grant	Date of Grant	Description of Project *	Status**
Johnson (V)	WPC-Vt-50	$527,900	$ 211,160	9-67	STP, INT	2
Colchester F. D. #1	WPC-Vt-52	758,100	333,540	12-67	STP, INT	2
Shelburne F. D. #1	WPC-Vt-53	1,038,000	519,000	8-68	STP, OS, INT	1
Northfield (V)	WPC-Vt-54	74,000	29,600	7-68	STP (A)	1
TOTALS - Vermont	36 Projects	$20,415,200	$6,980,644			
TOTALS - Lake Champlain Basin	48 Projects	$26,111,700	$7,927,598			

* Description of Project:

(A) - Additions and/or Alterations
FM - Force Main
INT - Intercepting Sewers
OS - Outfall Sewer
PS - Pumping Station
STP - Sewage Treatment Plant

** Status:

1 - Offer made

2 - Under Construction

3 - Project completed

September 20, 1968

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APPENDIX A

NEW YORK STREAM CLASSIFICATION

1. Classification-Lake Champlain and Interstate Tributaries
2. Water Quality Criteria
3. Water Pollution Abatement Schedule

INTERSTATE WATERS WITHIN NEW YORK STATE
ST. LAWRENCE RIVER BASIN
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

	Area of Lake Champlain or Tributaries	Primary Present & Future Uses	Class	Standards
	Lake Champlain			
1	Located between the States of New York and Vermont. All shoreside waters extending outward from the mainland at least one-quarter mile from the shoreline to a depth of thirty feet and beyond where necessary in the section beginning at the New York - Quebec (United States-Canada) boundary and extending along the westerly shoreline to the Lake Champlain Toll Bridge at Crown Point, with the exception of the following waters; Deep Bay, Cumberland Bay, the shoreside waters from Cumberland Bay southward to Ausable Point, Willsboro Bay, North West Bay and Bulwagga Bay.	Domestic water consumption, recreation, fishing, agriculture, navigation, waste disposal	A	A
2	Deep Bay, which is located to the northeast of Treadwell Bay and 5.3 miles east of the hamlet of Beekmantown	Fishing, recreation, agriculture	C	C
3	Portion of Cumberland Bay, which is located east of the City of Plattsburgh and on the westerly side of Lake Champlain. Included is that portion lying westerly of the line beginning at a landpoint to be found on the westerly shore of the peninsula called Cumberland Head 0.75 mile south, southeasterly of the northmost part of Cumberland Bay proper and extending from this point in a southwesterly direction to the shore end of the City of Plattsburgh.	Recreation, fishing, navigation, waste disposal	B	B
4	That portion of Cumberland Bay lying easterly and southerly of the line from the south line of the City of Plattsburgh and extending to Cumberland Head as described in the preceding item and westerly of the line beginning at Cumberland Head Lighthouse and extending southwesterly	Domestic water consumption, recreation, fishing, navigation	A	A

INTERSTATE WATERS WITHIN NEW YORK STATE
ST. LAWRENCE RIVER BASIN
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

	Area of Lake Champlain or Tributaries	Primary Present & Future Uses	Class	Standards
	Lake Champlain - cont'd			
4	to the northmost point of Crab Island, thence running northwesterly to the shore at the south line of the City of Plattsburgh.			
5	That portion of the lake enclosed by the lines described as follows: from the shore at the south line of the City of Plattsburgh to the northmost point of Crab Island; from the southmost point of Crab Island to the northmost point of Valcour Island; from the southmost point of Valcour Island to Ausable Point. Included are the areas around Crab Island and Valcour Island extending outward at least one-quarter mile from the shoreline and beyond where necessary to a depth of thirty feet.	Domestic water consumption, recreation, fishing, agriculture	A	A
6	Willsboro Bay, located north of the hamlet of Willsboro. Included is all that section inclosed by a line from the northmost point of Willsboro Point westerly to the mouth of Trib. 40 which enters Lake Champlain from the west 2.7 miles southeasterly of Port Douglas.	Domestic water consumption, recreation, fishing, agriculture	AA	AA
7	North West Bay, which is located on the westerly side of Lake Champlain and east of the Village of Westport. Included are the waters lying westerly and north of the line beginning at the point of the headland between Partridge Harbor and Hunter Bay and running southerly to an intersection with the New York-Vermont State line and a line directly east from the shoreline at Bluff Point.	Domestic water consumption, recreation, fishing, agriculture, waste disposal	A	A

INTERSTATE WATERS WITHIN NEW YORK STATE
ST. LAWRENCE RIVER BASIN
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

	Area of Lake Champlain or Tributaries	Primary Present & Future Uses	Class	Standards
	Lake Champlain - cont'd			
8	Bulwagga Bay, which is located to the south and slightly east of the Village of Port Henry.	Recreation, fishing, agriculture	B	B
9	Open reaches of the lake within New York State in the section beginning at the New York-Quebec (United States-Canada) border and extending southerly to the Lake Champlain Toll Bridge at Crown Point. Excluded are the sections described previously as "shoreside waters", Deep Bay, Cumberland Bay, the shoreside waters from Cumberland Bay to Ausable Point, Willsboro Bay, North West Bay, and Bulwagga Bay.	Domestic water consumption, recreation, fishing, navigation	AA	AA
10	That portion of Lake Champlain within New York State lying south of the Lake Champlain Toll Bridge at Crown Point and including South Bay.	Fishing, recreation, agriculture, navigation, waste disposal	C	C
	Mettawee River and Barge Canal			
11	Enters Lake Champlain from the southeast at the south shore of East Bay and 0.8 mile north of the Village of Whitehall. Mouth to a point 2.1 miles upstream from the mouth and at the confluence of the Barge Canal with the Mettawee River and 0.8 mile south of the south line of the Village of Whitehall.	Fishing, recreation, agriculture, navigation, waste disposal	C	C
	Mettawee River			
12	From the confluence with the Barge Canal upstream to Trib. 15. Trib. 15 enters from the southeast 0.2 mile east of the intersection of the Fort Ann-Granville-	Fishing, recreation, agriculture.	C	C

INTERSTATE WATERS WITHIN NEW YORK STATE
ST. LAWRENCE RIVER BASIN
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

	Area of Lake Champlain or Tributaries	Primary Present & Future Uses	Class	Standards
	Mettawee River - cont'd			
12	Whitehall township lines and 2.2 miles north of the hamlet of West Granville.			
13	From Trib. 15 to the New York-Vermont Boundary line at the east boundary of the Village of Granville.	Fishing, recreation, agriculture, waste disposal.	C	C(T)
	Poultney River			
14	Enters Lake Champlain from the northmost part of East Bay 2.8 miles north of the peak of Warner Hill and 3.2 miles northwest of the peak of Hampton Hill. Mouth to Carver Falls which are located 3.8 miles upstream from the mouth and 2.2 miles north of the peak of Hampton Hill. Included are the portions of the waters within New York State.	Fishing, recreation, agriculture.	C	C
15	From Carver Falls upstream to the point where the river leaves New York State 2.6 miles east of the peak of Thorn Hill and 0.9 mile south of the hamlet of Hampton. Included are the portions of the waters within New York State.	Fishing, recreation	C	C(T)

WATER QUALITY CRITERIA

STATE OF NEW YORK

CLASS AA

DEFINITION OR BEST USAGE: Source of water supply for drinking, culinary or food processing purposes and any other usages.

FLOW CONDITIONS:

1	Floating Solids	None attributable to sewage, industrial wastes or other wastes.
2	Setteable Solids	None attributable to sewage, industrial wastes or other wastes.
3	Sludge Deposits	None attributable to sewage, industrial wastes or other wastes.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Not Specified
5	Sewage or Other Effluent	None which are not effectively disinfected.
6	Oil, Grease, Oil Slicks, or Scum	Oil: None attributable to sewage, industrial wastes or other wastes.
7	Coliform Density	For series of 4 or more samples collected during any 30-day period: Average MPN not more than 50/100ml.; MPN of more than 50/100ml. in not more than 20% of samples collected.
8	pH	Range between 6.5 and 8.5.
9	Dissolved Oxygen	For trout waters, not less than 5.0 ppm. For non-trout waters, not less than 4.0 ppm.
10	Color	See Number 13.
11	Turbidity	Not Specified.
12	Taste, Odor	None attributable to sewage, industrial wastes or other wastes.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS: The waters, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present (Cont'd.)

WATER QUALITY CRITERIA STATE OF NEW YORK

CLASS AA (Cont'd.)

13 Toxic Wastes, Deleterious Substances:

None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life, make the waters unsafe or unsuitable as a source of water supply for drinking, culinary or food processing purposes or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

14(a) Heated Effluents:

See Number 13.

(b) Temperature Criteria:

(i) Trout waters:

No thermal discharges that would adversely affect the fishery.

(ii) Non-trout waters:

Within the mixing zone stream temperature shall not exceed 90°F. Outside the mixing zone stream temperature shall not exceed 86°F after mixing; no permanent change in excess of 5 F° above normal will be permitted; rate of temperature change shall be limited to 2 F° per hour, not to exceed 9 F° in any 24-hour period; average change for 7-day period shall be less than 5 F° above normal.

REMARKS (Cont'd.):

impurities, meet or will meet U. S. Public Health Service Drinking Water Standards and are or will be considered safe and satisfactory for drinking water purposes.

In determining the safety or suitability of waters in this class for use as a source of water supply for drinking, culinary or food processing purposes after approved treatment, the latest edition of "Public Health Service Drinking Water Standards" published by the United States Public Health Service will be used as the guide.

Based on non-trout waters of approximately median alkalinity (80 p.p.m.) or above for the state and without considering effects of combinations, the following may be considered as safe stream concentrations for this class of water. Waters of lower alkalinity must be specially considered since the toxic effect of most pollutants will be greatly increased.

Ammonia or Ammonium compounds: Not greater than 2.0 ppm at pH of 8.0 or above.
Ferro- or Ferricyanide : Not greater than 0.4 ppm (Fe(CN)6).
Cyanide: Not greater than 0.1 ppm (CN). Copper: Not greater than 0.2 ppm (Cu).
Zinc: : Not greater than 0.3 ppm (Zn). Cadium: Not greater than 0.3 ppm (Cd).

WATER QUALITY CRITERIA

STATE OF NEW YORK

CLASS A

DEFINITION OR BEST USAGE: Source of water supply for drinking, culinary or food processing purposes and any other usages.

FLOW CONDITIONS:

1	Floating Solids	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2	Settleable Solids	See Number 1.
3	Sludge Deposits	See Number 1.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Not Specified.
5	Sewage or Other Effluent	None which are not effectively disinfected.
6	Oil, Grease, Oil Slicks, or Scum	Oil: See Number 13(a).
7	Coliform Density	For series of 4 or more samples collected during any 30-day period: Average MPN not to exceed 5000/100ml.; MPN exceeding 5000/100ml. in not more than 20% of samples collected.
8	pH	Range between 6.5 and 8.5.
9	Dissolved Oxygen	For trout waters, not less than 5.0 ppm. For non-trout waters, not less than 4.0 ppm.
10	Color	See Number 13(a).
11	Turbidity	Not Specified.
12	Taste, Odor	Odor producing substances contained in wastes: The waters, after opportunity for reasonable dilution and mixture with wastes discharged thereto, shall not have an increased threshold odor number greater than 8 due to such added wastes.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS: The waters, if subjected to approved treatment equal to (Cont'd.)

WATER QUALITY CRITERIA STATE OF NEW YORK

CLASS A (Cont'd.)

13(a) Toxic Wastes, Deleterious Substances:

None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life, make the waters unsafe or unsuitable as a source of water supply for drinking, culinary or food processing purposes or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

(b) Phenolic Compounds:

Not greater than 5 parts per billion (Phenol).

14(a) Heated Effluents:

See Number 13(a).

(b) Temperature Criteria:

(i) Trout waters:

No thermal discharges that would adversely affect the fishery.

(ii) Non-trout waters:

Within the mixing zone, stream temperature shall not exceed 90°F.

Outside the mixing zone, stream temperature shall not exceed 86°F after mixing; no permanent change in excess of 5 F° above normal will be permitted; rate of temperature change shall be limited to 2 F° per hour, not to exceed 9 F° in any 24-hour period; average change for 7-day period shall be less than 5 F° above normal.

REMARKS (Cont'd.):

coagulation, sedimentation, filtration, and disinfection, with additional treatment if necessary to reduce naturally present impurities, meet or will meet U. S. Public Health Service Drinking Water Standards and are or will be considered safe and satisfactory for drinking water purposes.

In determining the safety or suitability of waters in this class for use as a source of water supply for drinking, culinary or food processing purposes after approved treatment, the latest edition of "Public Health Service Drinking Water Standards" published by the United States Public Health Service will be used as the guide.

Based on non-trout waters of approximately median alkalinity (80 p.p.m.) or above for the state and without considering effects of combinations, the following may be considered as safe stream concentrations for this class of water. Waters of lower alkalinity must be specially considered since the toxic effect of most pollutants will be greatly increased:

Ammonia or Ammonium compounds: Not greater than 2.0 ppm at pH of 8.0 or above.
Ferro- or Ferricyanide : Not greater than 0.4 ppm (Fe(CN)6).
Cyanide: Not greater than 0.1 ppm (CN). Copper: Not greater than 0.2 ppm (Cu).
Zinc: : Not greater than 0.3 ppm (Zn). Cadium: Not greater than 0.3 ppm (Cd).

WATER QUALITY CRITERIA STATE OF NEW YORK

CLASS B

DEFINITION OR BEST USAGE: Bathing and any other usages except as a source of water supply for drinking, culinary or food processing purposes.

FLOW CONDITIONS:

1	Floating Solids	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2	Settleable Solids	See Number 1.
3	Sludge Deposits	See Number 1.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Not Specified.
5	Sewage or Other Effluent	None which are not effectively disinfected.
6	Oil, Grease, Oil Slicks, or Scum	Oil: See Number 13.
7	Coliform Density	For series of 4 or more samples collected during any 30-day period: Average MPN not to exceed 2400/100ml.; MPN exceeding 2400/100ml. in not more than 20% of samples collected.
8	pH	Range between 6.5 and 8.5.
9	Dissolved Oxygen	For trout waters, not less than 5.0 ppm. For non-trout waters, not less than 4.0 ppm.
10	Color	See Number 13.
11	Turbidity	Not Specified.
12	Taste, Odor	Not Specified.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS:

WATER QUALITY CRITERIA STATE OF NEW YORK

CLASS B (Cont'd.)

13 Toxic Wastes, Deleterious Substances:

None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life, make the waters unsafe or unsuitable for bathing or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

14(a) Heated Effluents:

See Number 13.

(b) Temperature Criteria:

(i) Trout waters:

No thermal discharges that would adversely affect the fishery.

(ii) Non-trout waters:

Within the mixing zone, stream temperature shall not exceed 90°F.

Outside the mixing zone, stream temperature shall not exceed 86°F after mixing; no permanent change in excess of 5 F° above normal will be permitted; rate of temperature change shall be limited to 2 F° per hour, not to exceed 9 F° in any 24-hour period; average change for 7-day period shall be less than 5 F° above normal.

REMARKS (Cont'd):

In determining the safety or suitability of waters in this class for use as a source of water supply for drinking, culinary or food processing purposes after approved treatment, the latest edition of "Public Health Service Drinking Water Standards" published by the United States Public Health Service will be used as the guide.

Based on non-trout waters of approximately median alkalinity (80 p.p.m.) or above for the state and without considering effects of combinations, the following may be considered as safe stream concentrations for this class of water. Waters of lower alkalinity must be specially considered since the toxic effect of most pollutants will be greatly increased:

Ammonia or Ammonium compounds: Not greater than 2.0 ppm at pH of 8.0 or above.
Ferro- or Ferricyanide : Not greater than 0.4 ppm ($Fe(CN)_6$).
Cyanide: Not greater than 0.1 ppm (CN). Copper: Not greater than 0.2 ppm (Cu).
Zinc : Not greater than 0.3 ppm (Zn). Cadium: Not greater than 0.3 ppm (Cd).

WATER QUALITY CRITERIA

STATE OF NEW YORK

CLASS C

DEFINITION OR BEST USAGE: Fishing and any other usages except for bathing or as source of water supply for drinking, culinary or food processing purposes.

FLOW CONDITIONS:

1	Floating Solids	None which are readily visible and attributable to sewage, industrial wastes or other wastes or which deleteriously increase the amounts of these constituents in receiving waters after opportunity for reasonable dilution and mixture with the wastes discharged thereto.
2	Settleable Solids	See Number 1.
3	Sludge Deposits	See Number 1.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Not Specified.
5	Sewage or Other Effluent	Not Specified.
6	Oil, Grease, Oil Slicks, or Scum	Oil: See Number 13.
7	Coliform Density	Not Specified.
8	pH	Range between 6.5 and 8.5.
9	Dissolved Oxygen	For trout waters, not less than 5.0 ppm. For non-trout waters, not less than 4.0 ppm.
10	Color	See Number 13.
11	Turbidity	Not Specified.
12	Taste, Odor	Not Specified.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS:

WATER QUALITY CRITERIA STATE OF NEW YORK

CLASS C (Cont'd.)

13 Toxic Wastes, Deleterious Substances:

None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life or impair the waters for any other best usage as determined for the specific waters which are assigned to this class.

14(a) Heated Effluents:

See Number 13.

(b) Temperature Criteria:

(i) Trout waters:

No thermal discharges that would adversely affect the fishery.

(ii) Non-trout waters:

Within the mixing zone, stream temperature shall not exceed 90°F.

Outside the mixing zone, stream temperature shall not exceed 86°F after mixing; no permanent change in excess of 5 F° above normal will be permitted; rate of temperature change shall be limited to 2 F° per hour, not to excees 9 F° in any 24-hour period; average change for 7-day period shall be less than 5 F° above normal.

REMARKS (Cont'd):

In determining the safety or suitability of waters in this class for use as a source of water supply for drinking, culinary or food processing purposes after approved treatment, the latest edition of "Public Health Service Drinking Water Standards" published by the United States Public Health Service will be used as the guide.

Based on non-trout waters of approximately median alkalinity (80 p.p.m.) or above for the state and without considering effects of combinations, the following may be considered as safe stream concentrations for this class of water. Waters of lower alkalinity must be specially considered since the toxic effect of most pollutants will be greatly increased:

Ammonia or Ammonium compounds: Not greater than 2.0 ppm at pH of 8.0 or above.
Ferro- or Ferricyanide : Not greater than 0.4 ppm (Fe(CN)6).
Cyanide: Not greater than 0.1 ppm (CN). Copper: Not greater than 0.2 ppm (Cu).
Zinc : Not greater than 0.3 ppm (Zn). Cadium: Not greater than 0.3 ppm (Cd).

TABLE A-1

WATER POLLUTION ABATEMENT SCHEDULE
MUNICIPAL AND INDUSTRIAL WASTE SOURCES, NEW YORK
LAKE CHAMPLAIN BASIN [1], [2]

Waste Source	Receiving Water	Report Due	Submit Final Plans	Start Constr.	Complete Constr.
MUNICIPAL					
Granville	Mettawee R.	5/67	1/68	9/68	1/70
Whitehall	Mettawee R.	-	5/68	4/69	9/70
Ticonderoga Village	Ticonderoga Cr.	4/67	2/69	6/69	9/70
	(Atlernate)	4/67	2/69	4/69	7/70
Moriah SD #1	Lake Champlain				
Moriah SD #2	Lake Champlain				
Port Henry Village	Lake Champlain				4/72 [3]
Mineville	Mill Brook Lake Champlain				
Grover Hill Housing	Mill Brook Lake Champlain				
Westport	Lake Champlain		4/68	4/69	12/70
Willsboro	Bouquet R.				4/72 [3]
Keesville	Ausable R.				
Peru SD #1	Little Ausable R.				
Plattsburgh	Saranac R.	10/67	9/68	4/69	7/70
Champlain Park SD	Lake Champlain				
Chazy	Little Chazy R.				
Champlain Village	Great Chazy R.				
Rouses Point Village	Lake Champlain				4/72 [3]
INDUSTRIAL					
International Paper Co.	Ticonderoga Cr.	3/68	10/68	4/69	7/70
Republic Steel Corp.	Bartlett Brook Mill Brook				
J & J Rogers Co.	Ausable R.	5/68	5/69		
Imperial Paper Co.	Saranac R.		10/68	4/69	7/70
Diamond National Corp.	Lake Champlain		10/68	4/69	7/70
Georgia Pacific Corp.	Lake Champlain		10/68	4/69	7/70
Champlain Creameries	Great Chazy R.				

[1] Includes only those waste discharges that directly or indirectly affect the Lake.

[2] Schedules taken from New York Water Quality Standards as submitted to the Secretary of the Interior in May 1967 and the Existing Polluters, Legal Action Orders Issued listing included in the State FY-69 Programs Plan Submission.

[3] Under Department Directive (voluntary compliance).

APPENDIX B

VERMONT STREAM CLASSIFICATION

1. Classification-Lake Champlain and Interstate Tributaries
2. Water Quality Criteria
3. Water Pollution Abatement Schedule

INTERSTATE WATERS WITHIN VERMONT
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

	Area of Lake or Tributaries	Primary Present & Future Uses	Class
	Lake Champlain		
1	Entire Lake.	Bathing, other recreational purposes, agricultural uses, industrial processes and cooling, fishing and wildlife habitat, good aesthetic value.	B
2	Mettawee River	Bathing, other recreational purposes, agricultural uses, industrial processes and cooling, fishing and wildlife habitat, good aesthetic value.	B
3	Poultney River		
	Source to Middletown Springs	Same as above.	B
	Middletown Springs to Poultney Treatment Plant	" " "	B
	Poultney Treatment Plant to Lewis Creek	Fish and wildlife habitat; recreational boating, and industrial processes and cooling; under some conditions acceptable for public water supply with appropriate treatment; good aesthetic value.	C
	Lewis Creek to confluence with Castleton River	Same as 1 & 2 above.	B
	Confluence with Castleton River to Mud Brook	Fish and wildlife habitat; recreational boating, and industrial processes and cooling; under some condi-	C

INTERSTATE WATERS WITHIN VERMONT
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN & INTERSTATE TRIBUTARIES

Area of Lake or Tributaries	Primary Present & Future Uses	Class
Lake Champlain - cont'd		
3 Poultney River - cont d		
Confluence with Castleton River to Mud Brook	cont'd tions acceptable for public water supply with appropriate treatment; good aesthetic value.	
Mud Brook to mouth	Fish and wildlife habitat; recreational boating, and industrial processes and cooling; under some conditions acceptable for public water supply with appropriate treatment; good aesthetic value.	C
4 Missisquoi River	-	-
Scheduled for classification in 1969		

WATER QUALITY CRITERIA (NOTE: Except where noted by an asterisk (*), these criteria have been approved by the Secretary of the Interior.)	STATE OF VERMONT CLASS A

DEFINITION OR BEST USAGE: Suitable for water supply and all other water uses; character uniformly excellent.

FLOW CONDITIONS: Minimum average daily flow for 7 consecutive days with 10 year recurrence interval.

1	Floating Solids	None allowable.
2	Settleable Solids	Not Specified.
3	Sludge Deposits	None allowable.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Solid Refuse: None allowable.
5	Sewage or Other Effluent	All sewage treatment plant effluents shall receive disinfection before discharge to the watercourse. The degree of treatment and disinfection shall be as required by the state pollution control agency.
6	Oil, Grease, Oil Slicks, or Scum	Oils, Grease, Scum: None allowable.
7	Coliform Density	Not to exceed a median of 100/100ml., nor more than 500 per 100ml. in more than 10% of samples collected.
8	pH	As naturally occurs.
9	Dissolved Oxygen	75% saturation, 16 hours per day; 5 mg/l at any time.
10	Color	None other than of natural origin.
11	Turbidity	None other than of natural origin.
12	Taste, Odor	None other than of natural origin.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS: Class A waters reserved for water supply may be subject to restricted use by state and local regulation. (Continued)

WATER QUALITY CRITERIA STATE OF VERMONT

CLASS A (Cont'd.)

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13 Toxic Wastes, Deleterious Substances:

Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays including assessment of taste and odor in edible fish shall be performed as required by the appropriate agencies. For public drinking water supplies the limits prescribed by the United States Public Health Service may be used where not superseded by more stringent signatory state requirements.

14(a) Heated Effluents:

Not Specified.

(b) Temperature Criteria - Allowable Temperature Increase:

None other than of natural origin.

REMARKS (Cont'd.):

These Standards do not apply to conditions brought about by natural causes. Radioactivity limits to be approved by the appropriate state agency with consideration of possible adverse effects in downstream waters from discharge of radioactive wastes; limits in a particular watershed to be resolved when necessary after consultation between states involved.

WATER QUALITY CRITERIA
(NOTE: Except where noted by an asterisk (*), these criteria have been approved by the Secretary of the Interior.)

STATE OF VERMONT

CLASS B

DEFINITION OR BEST USAGE: Suitable for bathing, other recreational purposes, agricultural uses, industrial processes and cooling; excellent fish and wildlife habitat; good aesthetic value; acceptable for public water supply with appropriate treatment.

FLOW CONDITIONS: Minimum average daily flow for 7 consecutive days with 10 year recurrence interval.

1	Floating Solids	None allowable.
2	Settleable Solids	Not Specified.
3	Sludge Deposits	None allowable.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Solid Refuse: None allowable.
5	Sewage or Other Effluent	All sewage treatment plant effluents shall receive disinfection before discharge to the watercourse. The degree of treatment and disinfection shall be as required by the state pollution control agency.
6	Oil, Grease, Oil Slicks, or Scum	Oils, Grease, Scum: None allowable.
7	Coliform Density	Not to exceed a median of 1000/100ml., nor more than 2400 per 100ml. in more than 20% of samples collected.
8	pH	6.5 to 8.0.
9	Dissolved Oxygen	75% saturation, 16 hours per day; 5 mg/l at any time.
10	Color	None in such concentrations that would impair any usages specifically assigned to this Class.
11	Turbidity	None in such concentrations that would impair any usages specifically assigned to this Class.
12	Taste, Odor	None in such concentrations that would impair any usages specifically assigned to this Class.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS: Class B waters shall be substantially free of pollutants that:

a) Unduly affect the composition of bottom fauna, (Continued)

WATER QUALITY CRITERIA STATE OF VERMONT

CLASS B (Cont'd.)

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13 Toxic Wastes, Deleterious Substances:

Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays including assessment of taste and odor in edible fish shall be performed as required by the appropriate agencies. For public drinking water supplies the limits prescribed by the United States Public Health Service may be used where not superseded by more stringent signatory state requirements.

14(a) Heated Effluents:

Not Specified.

(b) Temperature Criteria - Allowable Temperature Increase:

Only such increases that will not impair any usages specifically assigned to this Class. In no case shall the temperature of the receiving water be raised more than 4 F°.

*For waters supporting cold water fisheries the temperature increase shall not raise the temperature of the receiving waters above 68°F.

For waters supporting a warm water fishery the temperature increase shall not raise the temperature of the receiving waters above 83°F.

REMARKS (Cont'd.):

b) Unduly affect the physical or chemical nature of the bottom,
c) Interfere with the propagation of fish.

These standards do not apply to conditions brought about by natural causes. Radioactivity limits to be approved by the appropriate state agency with consideration of possible adverse effects in downstream waters from discharge of radioactive wastes; limits in a particular watershed to be resolved when necessary after consultation between states involved.

WATER QUALITY CRITERIA

(NOTE: Except where noted by an asterisk (*), these criteria have been approved by the Secretary of the Interior.)

STATE OF VERMONT

CLASS C

DEFINITION OR BEST USAGE: Suitable for fish and wildlife habitat; recreational boating, and industrial processes and cooling; under some conditions acceptable for public water supply with appropriate treatment; good aesthetic value.

FLOW CONDITIONS: Minimum average daily flow for 7 consecutive days with 10 year recurrence interval.

1	Floating Solids	None shall be allowed except for such small amounts that may result from the discharge of appropriately treated sewage or industrial waste effluents.
2	Settleable Solids	Not Specified.
3	Sludge Deposits	See Number 1.
4	Solid Refuse, Garbage, Cinders, Ashes, Oils, Sludge or Other Refuse	Solid Refuse: None.
5	Sewage or Other Effluent	All sewage treatment plant effluents shall receive disinfection before discharge to the watercourse. The degree of treatment and disinfection shall be as required by the state pollution control agency.
6	Oil, Grease, Oil Slicks, or Scum	Oils, Grease, Scum: See Number 1.
7	Coliform Density	None in such concentrations that would impair any usages specifically assigned to this Class.
8	pH	6.0 to 8.5.
*9	Dissolved Oxygen	5 mg/l, 16 hours per day; not less than 3 mg/l at any time. For cold water fishery, not less than 5 mg/l at any time.
10	Color	None in such concentrations that would impair any usages specifically assigned to this Class.
11	Turbidity	None in such concentrations that would impair any usages specifically assigned to this Class.
12	Taste, Odor	None in such concentrations that would impair any usages specifically assigned to this Class.
13	Toxic Wastes, Deleterious Substances:	See over.
14	Heated Effluents and Temperature Criteria:	See over.

REMARKS: Class C waters shall be substantially free of pollutants that:

a) Unduly affect the composition of bottom fauna, (Continued)

WATER QUALITY CRITERIA STATE OF VERMONT

CLASS C (Cont'd.)

13 Toxic Wastes, Deleterious Substances:

Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bioassays including assessment of taste and odor in edible fish shall be performed as required by the appropriate agencies. For public drinking water supplies the limits prescribed by the United States Public Health Service may be used where not superseded by more stringent signatory state requirements.

14(a) Heated Effluents:

Not Specified.

(b) Temperature Criteria - Allowable Temperature Increase:

Only such increases that will not impair any usages specifically assigned to this Class. In no case shall the temperature of the receiving water be raised more than 4 F°

*For waters supporting cold water fisheries the temperature increase shall not raise the temperature of the receiving waters above 68°F.

For waters supporting a warm water fishery the temperature increase shall not raise the temperature of the receiving waters above 83°F.

REMARKS (Cont'd.):

b) Unduly affect the physical or chemical nature of the bottom,

c) Interfere with the propagation of fish.

These Standards do not apply to conditions brought about by natural causes. Radioactivity limits to be approved by the appropriate state agency with consideration of possible adverse effects in downstream waters from discharge of radioactive wastes; limits in a particular watershed to be resolved when necessary after consultation between states involved.

TABLE B-1

WATER POLLUTION ABATEMENT SCHEDULE
MUNICIPAL AND INDUSTRIAL WASTE SOURCES, VERMONT
LAKE CHAMPLAIN BASIN 1/, 2/

Waste Source 4/	Receiving Water	Report Due	Submit Final Plans	Start Constr.	Complete Constr.
MUNICIPAL 3/					
Shelburne FD #2	La Platte R.	x	2/69	5/69	9/70
S. Burlington FD #4	Potash Brook Shelburne Bay	x	2/69	5/69	9/70
Queen City Park	Potash Brook Shelburne Bay				
Burlington (Main Plant)	Lake Champlain	x	2/69	5/69	9/70
S. Burlington (Main Plant)	Winooski R.	x			
Burlington (Riverside)	Winooski R.	x			
Burlington (North End)	Winooski R.	x			
Colchester FD #1	Winooski R.	x	x		
Winooski	Winooski R.	x	x		
St. Albans	Stevens Brook St. Albans Bay	x	2/69	5/69	9/70
Alburg	Lake Champlain	1/69	10/69	4/70	6/71
Swanton	Missisquoi R.	-			
Shelburne FD #1 4/	Lake Champlain			9/68	1/70
INDUSTRIAL 5/					
Fair Haven Mills	Castleton R.	3/68	7/68	9/69	12/68
Vermont Cut Slate	Castleton R.	3/68	7/68	9/68	12/68
Vermont Structural Slate, Fair Haven	Castleton R.	3/68	7/68	9/68	12/68
Vermont Structural Slate, Hydville	Castleton R.	3/68	7/68	9/68	12/68
Economu Cheese Co.	La Platte R.				
Louis E. Farrell	Lake Champlain				
John McKenzie Pkg.	Winooski R.				
Milton Co-op Dairy	Lamoille R.				
Missisquoi Specialty Board	Missisquoi R.				
Vermont Dressed Beef	Missisquoi R.				

1/ Includes only those waste discharges that directly or indirectly affact the Lake.

2/ Schedules taken from Vermont Water Quality Standards as submitted to the Secretary of the Interior in June 1967 and as supplemented in September 1967.

3/ All other communities not listed and planning municipal collection and treatment shall submit a preliminary report by Januray 1, 1969, shall submit final plans by October 1, 1969, shall start construction by April 1, 1970 and shall complete construction no later than June 1, 1971. Where no municipal collection and treatment are contemplated it is assumed that pollution abatement will proceed on an individual basis.

4/ New Secondary Treatment Facility - not a system at this time.

5/ Those industries with waterborne wastes that will not be collected and treated in a municipal system, shall submit a preliminary report on their abatement program by January 1, 1969, shall submit final plans by October 1, 1969, shall start construction by April 1, 1970 and shall complete construction by June 1, 1971.

x Activity already accomplished.

APPENDIX C

The Federal Water Pollution Control Administration water quality survey of Lake Champlain was conducted during the period August 19-26, 1968. This survey consisted of a number of stations along the Vermont - New York State line with expanded grids in the vicinity of major tributaries and areas of waste discharges. One hundred and forty-five (145) samples were collected at 93 sampling stations. Eight stations were located in the Champlain Canal and 85 in Lake Champlain. At several stations, samples were taken from as many as three different depths. One sample only was collected at each sampling point.

Figures C-1 and C-2 present the location of each station while Table C-1 lists the results of the survey.

TABLE C-1

DATA, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION SURVEY OF LAKE CHAMPLAIN, AUGUST 1968

Station [1]	Water Temp °C	DO mg/l	Percent Sat.	BOD [2] mg/l	TOC [3] mg/l	Secchi Disc inches	Color Pt-Co Units	Total Solids mg/l	Total Alkalinity mg/l	T-N [4] mg/l	NO_3-N mg/l	PO_4 [5] mg/l	Total [6] Coliform /100 ml	Fecal [6] Coliform /100 ml
CC-194	20.5	7.7	84		4	18	60		5.5	.38	.23	.44	1,900	64
CC-200	21.5	7.9	90		4	18	30		3.0	.58	.14	.47	1,500	100
CC-205	21.5	7.8	89		6	7	50		21.8	.60	.28	.45	940	64
CC-209	21.8	7.1	80		6	6	60		21.8	.58	.23	.30	17,000	1,700
CC-214	21.8	7.4	84		4	6	60	120	42.0	.40	.31	.50	150,000	20,000
CC-217	21.7	7.3	83		7	6	80		57.5	.29	.20	.33	180,000	3,300
CC-219	22.0	6.8	77		9	6	60	138	59.1	.50	.21	.85	490,000	7,200
CC-220	22.0	7.2	82		11	6	60	115	66.0	.53	.21	.53	110,000	7,500
LC-0	22.0	6.7	76		4	6	60	110	66.0	.38	.24	1.87	28,000	1,800
LC-3	22.0	7.4	84		4		40		77.0	.35	.14	.30	680	64
LC-7	22.0	6.8	77		4	6	30	127	79.0	.41	.14	.68	560	72
LC-10	21.4	6.7	75		5	6	40		80.0	.53	.16	.52	920	24
LC-13.5	21.0	8.0	89		5	18	30	150	84.5	.41	.08	.18	960	44
LC-18-S	21.0	7.7	86	1.1	4		30	143	88.5	.32	.07	.21	420	8
LC-18-D	21.0	7.7	86	1.0	5		30	154	88.5	.30	.07	.25	200	4
LC-18A	21.0	7.8	87		4	18	40	153	87.2	.38	.07	.28	2,100	24
LC-18B	21.0	8.2	91		7	18	40	129	91.0	.33	.07	.95	72	4
LC-20-S	21.5	4.7	54	1.6	6		60		86.5	.41	.07	.33	12,000	620
LC-20-D	21.5	5.6	64	1.7	7		60		87.2	.63	.08	.23	6,300	180
LC-20A	21.3	2.6	29	1.9	7		60	130	83.5	.42	.07	1.28	9,900	310
LC-20B	21.5	4.6	52	1.7	7	18	60	143	85.5	.42	.08	1.28	6,500	120
LC-20.5-S	21.5	4.2	48	1.8	7		60	146	85.5	.50	.07	.23	6,800	270
LC-20.5-D	21.5	3.7	42	2.2	7		60	147	86.5	.47	.08	.35	7,300	820
LC-20.5A	21.6	1.5	17	8.9	12	18	80	170	89.0	.50	.07	.30	320,000	11,000
LC-20.5B	22.2	4.5	51	1.4	7		50	153	86.5	.42	.08	.43	6,900	180
LC-21-S	22.5	4.0	46	1.2	7	18	60	108	83.0	.44	.07	.21	8,200	770
LC-21-D	22.0	1.4	16		8		50	149	88.0	.45	.08	.21	80,000	5,900
LC-21A	22.0	2.2	25	4.0	11	18	60	155	92.0	.43	.07	.25	53,000	3,100
LC-21B		3.2	36	1.9	7		60	90	84.0	.44	.08	.21	26,000	980
LC-22-S	21.8	4.5	51	1.7	8	18	60	125	91.0	.43	.08	.18	6,600	280
LC-22-D	21.5	4.5	51	1.6	10		60	125	81.0	.44	.09	1.15	8,200	420
LC-22A	22.3	3.1	35	2.6	8	12	60	133	81.0	.48	.09	.25	39,000	2,000
LC-22B	22.3	4.3	49	1.8	6	18	60	164	92.0	.53	.07	.25	4,800	180
LC-24-S	21.3	7.8	87		5	18	60		78.0	.38	.09	.50	84	4
LC-24-D	21.0	7.7	86		5		80		77.0	.33	.10	.25	36	12
LC-26-S	21.0	8.0	89		5	18	100	140	85.0	.30	.12	.38	64	4
LC-26-D	21.0	8.0	89		5		80	157	77.8	.29	.11	.18	44	4
LC-30-S	20.8	8.3	92		5	12	80		67.5	.29	.10	.43	40	4
LC-30-D	21.0	8.2	91		4		80		73.2	.24	.09	.17	8	4
LC-35-S	20.4	9.0	98		4	36	30	84	59.0	.23	.06	.15	56	8
LC-35-D	19.8	9.1	99		4		30	72	50.5	.28	.05	.15	110	4
LC-36-S	19.8	9.0	98		5	72	20	62	50.2	.45	.05	.19	220	4
LC-36-D	19.8	8.7	95		3		20	67	50.5	.25	.06	.13	240	4
LC-36A	19.8	9.0	98		4	72	20	53	50.2	.25	.07	.08	860	8
LC-36B	19.8	9.0	98		5	60	20	98	51.0	.60	.05	.17	2,000	24
LC-41-S	19.4	9.2	98		3	108	20	60	49.0	.30	.04	.10	290	4
LC-41-D	9.8	9.4	83		6		20	100	44.5	.35	.05	.48	560	4

TABLE C-1 (Cont'd.)

Station 1/	Water Temp °C	DO mg/1	Percent Sat.	BOD 2/ mg/1	TOC 3/ mg/1	Secchi Disc inches	Color Pt-Co Units	Total Solids mg/1	Total Alkalinity mg/1	T-N 4/ mg/1	NO_3-N mg/1	PO_4 5/ mg/1	Total 6/ Coliform /100 ml	Fecal 6/ Coliform /100 ml
LC-46-S	18.8	9.0	96		3	120	20		48.0		.05	.10	1,200	76
LC-46-D	18.6	9.0	96		3		20		46.0	.50	.05	.22	1,700	210
LC-47-S	19.0	9.1	97		3	180	20		46.0	.50	.05	.08	420	4
LC-47-D	9.4	10.4	90		2		20		43.5	.75	.06	1.94	260	4
LC-47A	18.6	9.2	98		2		20		46.0	.60	.20	.05	250	4
LC-47B-S	19.5	9.3	99		3	150	20		49.0	.30	.05	.17	460	4
LC-47B-D	19.1	9.0	96		2		20		48.0	.30	.05	.48	420	4
LC-50	19.6	9.1	99		3	48	10		49.0	1.05	.05	.14	630	4
LC-53-S		9.3	101		2	144	10		46.5	.25	.05	.08	1,100	4
LC-53-D		8.9			4		10	58	49.0	.40	.06	.08	620	4
LC-59-S	18.6	9.4	100		3	168	10		47.0	.35	.17	.90	1,400	4
LC-59-D	11.4	9.9	90		3		20		46.0	.35	.05	.38	500	4
LC-59A	19.0	9.5	101		2	144	20	12	48.0	.35	.05	.17	360	4
LC-59B-S	17.8	9.4	99		2	168	20	13	47.0	.40	.06	.08	880	4
LC-59B-D	9.4	10.3	89		3		20	55	46.5	.30	.22	.10	520	4
LC-59C	18.8				3	120	20	5	44.5	.30	.05	.10	560	4
LC-65-S	18.6	9.1	97		3	192	20		47.0	.35	.03	.76	8	4
LC-65-D	9.4	10.2	88		2		20		44.0	.90	.21	.05	40	4
LC-72-S		9.2			3	144	30		46.5	.50	.04	.14	2,000	4
LC-72-D	9.2	9.9	85		4		30		42.5	.90	.21	.10	540	4
LC-77-S	18.7	9.1	97		2	144	30		44.0	.25	.04	.05	820	4
LC-77-D	9.6	9.8	87		2		30		47.2	.25	.20	.05	340	4
LC-77A	18.8	9.3	99		2		30		44.5	.35	.04	.05	380	4
LC-83-S	19.5	9.2	100		6	222	30	31	44.5	.80	.04	.77	330	4
LC-83-D	9.4	9.8	85		3		30	69	43.5	.75	.22	.08	660	4
LC-89-S	19.6	9.0	98		4	232	30		44.0	.60	.04	.05	540	4
LC-89-M	9.8	9.4	83		2		30		45.0	.30	.24	.05	440	4
LC-89-D	9.0	9.8	85		3		20		42.5	.75	.24	.62	520	4
LC-94-S	20.4	9.3	103		4	174	20	91		.25	.04	.08	240	4
LC-94-D	10.0	9.1	80		2		10		41.5	.30	.22	.10	720	4
LC-94A-S	19.5	9.2	100		6		20		46.5	1.65	.15	.60	220	4
LC-94A-D	10.8	9.0	81		4		30		47.0	.15	.22	.13	540	4
LC-102-S	19.8	9.0	100		3	210	30		45.0	.40	.04	.10	140	4
LC-102-D	20.8	9.0	101		4		20		44.0	.40	.04	.25	300	4
LC-102A	21.0	9.3	103		3		30		45.0	.45	.04	.13	88	4
LC-102B	21.0	9.4	104		4		30		43.0	.35	.04	.13	440	4
LC-102C	21.8	9.1	103		4		30		46.0	.30	.04	.10	16	4
LC-106-S	20.8	9.1	101		4	192	30	26	45.5	.50	.03	.10	40	4
LC-106-D	20.0	9.1	100		5		30	100	44.0	.35	.03	.08	340	4
LC-106A	20.5	9.5	104		5		30		46.5	.30	.04	.14	740	210
LCS-1-S	17.8	9.3	98		3	192	20		44.5	.25	.04	.05	2,300	32
LCS-1-D	10.8	9.2	83		2		20		47.2	.30	.19	.48	1,200	4
LCS-2-S	18.6	9.0	96		2	144	20		44.5	.45	.04	.13	4,000	190
LCS-2-D	10.2	9.6	85		2		20		46.8	.40	.20	.03	880	4
LCS-3-S	18.7	9.2	98		3	132	20		44.5	.40	.04	.03	580	8
LCS-3-D	15.8	8.6	86		2		20		45.0	.20	.08	.05	980	4
LCS-4	18.6	9.5	101		6	120	20		43.0	.25	.03	.10	560	4

TABLE C-1 (Cont'd.)

Station [1]	Water Temp °C	DO mg/l	Percent Sat.	BOD [2] mg/l	TOC [3] mg/l	Secchi Disc inches	Color Pt-Co Units	Total Solids mg/l	Total Alkalinity mg/l	T-N [4] mg/l	NO_3-N mg/l	PO_4 [5] mg/l	Total [5] Coliform /100 ml	Fecal [6] Coliform /100 ml
LCB-1-S	18.5	9.2	97		3	156	20	55	45.5	.15	.05	.17	1,200	4
LCB-1-M	14.6	8.7	85		3		20	31	45.0	.30	.12	.08	1,200	4
LCB-1-D	8.8	9.9	86		3		20	20	45.0	.30	.21	.29	600	4
LCB-2-S	18.4	9.1	96		3	144	30	37	45.0	.55	.04	.14	880	4
LCB-2-D	9.2	10.2	88		3		20	46	46.0	1.05	.04	.14	440	4
LCB-3-S	18.5	9.3	98		3	156	20	93	45.0	.40	.04	.48	1,300	4
LCB-3-D	18.4	9.3	98		3		20	52	42.0	.40	.04	.10	1,500	4
LCB-4-S	18.6	9.2	98		3	144	20	91	46.0	.80	.04	.05	780	8
LCB-4-D	17.8	8.6	90		3		20	27	44.2	2.05	.05	.10	840	12
LCB-5-S	18.2	9.0	96		4	168	20	35	45.5	.25	.03	.03	3,300	48
LCB-5-D	18.6	9.2	97		4		20	33	46.0	.35	.04	.13	720	16
LCW-1-S	18.5	9.4	99		4	144	30		45.5	.35	.05	.08	420	4
LCW-1-D	8.4	10.3	87		4		30		45.5	.55	.23	.08	260	4
LCW-2	18.4	9.5	100		2	132	30		44.2	.45	.04	.05	620	4
LCA-1-S	18.7	9.5	101		3	150	30		47.5	.75	.04	.10	560	4
LCA-1-D	18.5	9.3	98		4		30		47.5	.85	.04	.05	2,700	4
LCA-2	18.4	9.5	100		7	138	30		46.0	.25	.04	.13	1,300	4
LCA-3	18.5	9.2	97		3	144	20		49.0	.25	.05	.22	1,400	4
LCA-4-S	18.5	9.4	99		2	138	30		43.0	.25	.04	.05	2,000	4
LCA-4-D	14.8	8.3	81		4		30		45.5	.20	.13	.03	2,200	4
LCC-1-S	18.8	9.2	98		3	180	30	74	45.5	.90	.10	.08	1,100	4
LCC-1-D	10.5	9.7	86		4		30	95	42.5	.40	.22	.25	720	4
LCC-2-S	19.2	9.1	97		2		30	75	47.0	.65	.04	.13	560	4
LCC-2-D	18.7	8.9	95		4		30	85	45.0	.40	.04	.05	1,200	8
LCC-3	19.2	5.8	62		13	36	40	58	44.5	.35	.07	.17	20,000	3,800
LCC-4	18.8	9.1	97		3		30	105	44.5	.65	.04	.03	1,200	130
LCV-1-S	21.2	9.1	102		4	156	30		32.5	.40	.03	.08	60	4
LCV-1-D	19.8	9.2	100		7		30		36.0	.30	.04	.22	180	4
LCV-2-S	21.0	9.0	100		5	120	30	69	29.5	.25	.04	.34	320	4
LCV-2-D	20.8	9.1	101		4		30	78	32.0	.20	.04	.13	620	4
LCV-3-S	20.7	9.2	101		3	156	30		34.0	.55	.04	.19	120	4
LCV-3-D	19.8	9.1	99		3		30		32.0	1.30	.04	.10	170	4
LCV-4-S	20.7	9.1	100		2	156	20	80	35.5	.30	.03	.08	400	4
LCV-4-M	17.5	6.0	62		2		20	93	36.5	.25	.06	.05	1,600	4
LCV-4-D	14.6	5.1	50		2		20	91	34.5	.30	.12	1.19	1,200	4
LCV-5	20.5	9.0	99		4		20			.30			780	4
LCV-6-S	20.0	8.9	97		2	198	20	90	33.2	.30	.03	.05	660	4
LCV-6-D	20.0	9.0	98		2		20	91	37.0	.40	.04	.64	700	4
LCV-7-S	20.8	9.2	102		3	180	20	93	35.5	.45	.03	.10	160	4
LCV-7-D	20.2	8.4	92		2		20	85	32.5	.30	.03	.10	96	4
LCV-8	21.5	9.4	105		4	120	20	83	35.5	.50	.04	.25	270	4
LCV-9	21.8	9.3	105		2	180	20	87	36.0	.35	.04	.13	150	4
LCV-10-S	20.4	9.1	100		4	180	20		34.2	.60	.03	.37	740	4
LCV-10-D	20.0	8.7	95		3		20		37.0	.90	.03	.10	800	4

TABLE C-1 (Cont'd.)

Station 1/	Water Temp °C	DO mg/1	Percent Sat.	BOD 2/ mg/1	TOC 3/ mg/1	Secchi Disc inches	Color Pt-Co Units	Total Solids mg/1	Total Alkalinity mg/1	T-N 4/ mg/1	NO_3-N mg/1	PO_4 5/ mg/1	Total 6/ Coliform /100 ml	Fecal 6/ Coliform /100 ml
LCV-11-S	21.0	9.2	102		2	150	20			.70	.05	.08	110	4
LCV-11-D	19.6	8.1	88		3		20			.75	.03	.13	1,200	4
LCV-12	20.5	9.2	101		3	144	20	93		.60	.05	.05	440	4
LCV-13-S	21.7	9.3	105		2	180	20		35.5	.30	.04	.08	400	4
LCV-13-D	15.5	5.2	51		2		20		36.5	.40	.11	.32	1,300	4
LCD-1-S	20.0	9.3	101		4	138	20		46.2	.35	.05	.08	1,000	4
LCD-1-D	19.0	9.4	100		3		20		47.0	.80	.04	1.08	290	4

1/ See Figures C-1 and C-2 for sampling station locations.
2/ BOD: 5 day 20°C Biochemical Oxygen Demand, 100 percent dilution.
3/ TOC: Total Organic Carbon.
4/ Total Nitrogen as Nitrogen as measured by Auto-Analyzer.
5/ Total Phosphate as PO_4
6/ Total and Fecal Coliform measured by membrane filter (MF).

S - Surface Stations - taken five feet from water surface.
M - Mid Stations - taken in the thermocline where stratification occurred.
D - Deep Stations - taken five feet from bottom where no stratification occurred. Taken within the hypolimnion where stratification was present.
CC - Stations in Champlain Canal.
LC - Stations in Lake Champlain.
LCS - Stations in Shelburne Bay.
LCB - Stations in Burlington Bay.
LCW - Stations near Winooski River.
LCA - Stations near Ausable River.
LCC - Stations in Cumberland Bay.
LCV - Stations in Northeast Arm.
LCD - Stations in Deep Bay.

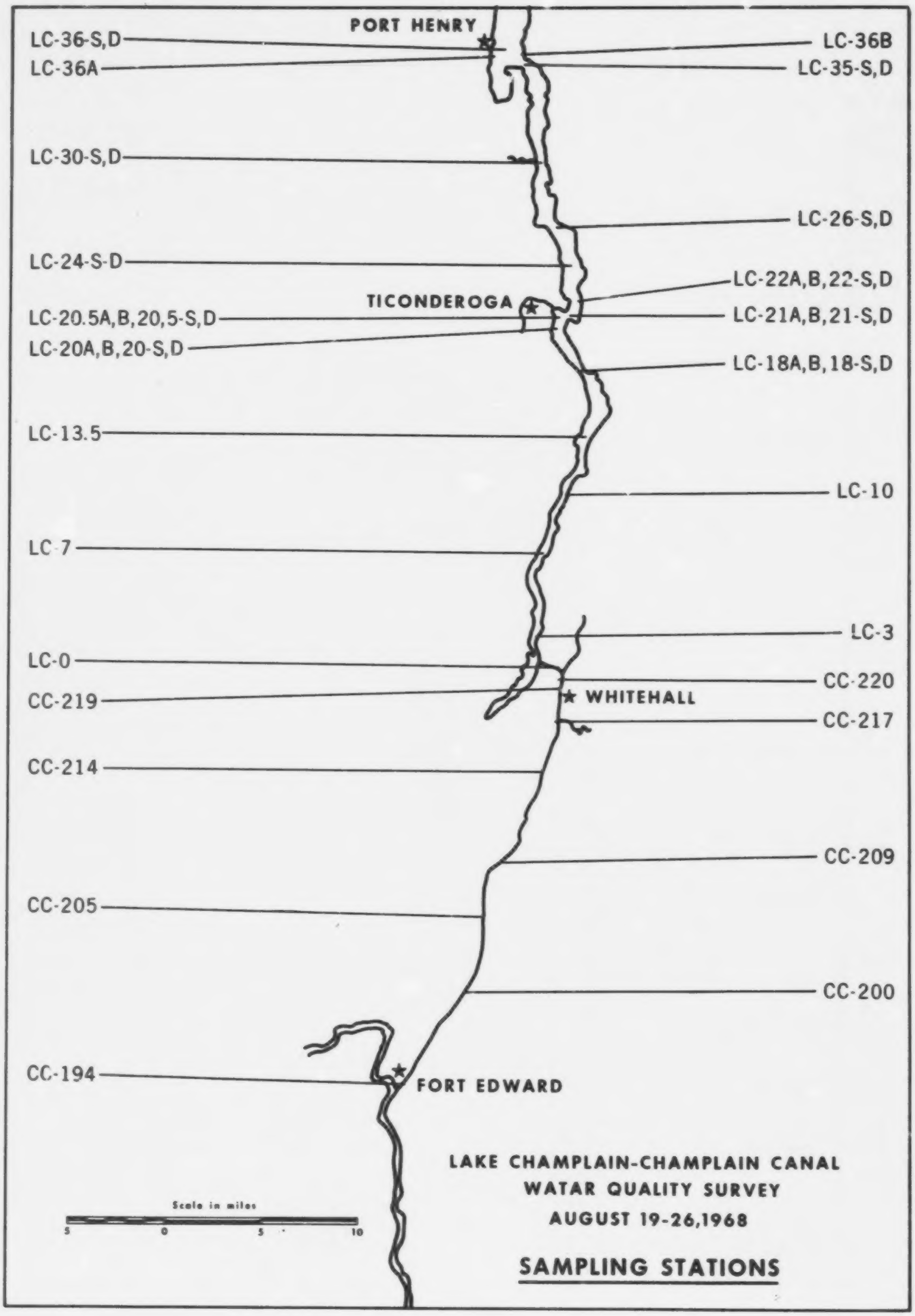
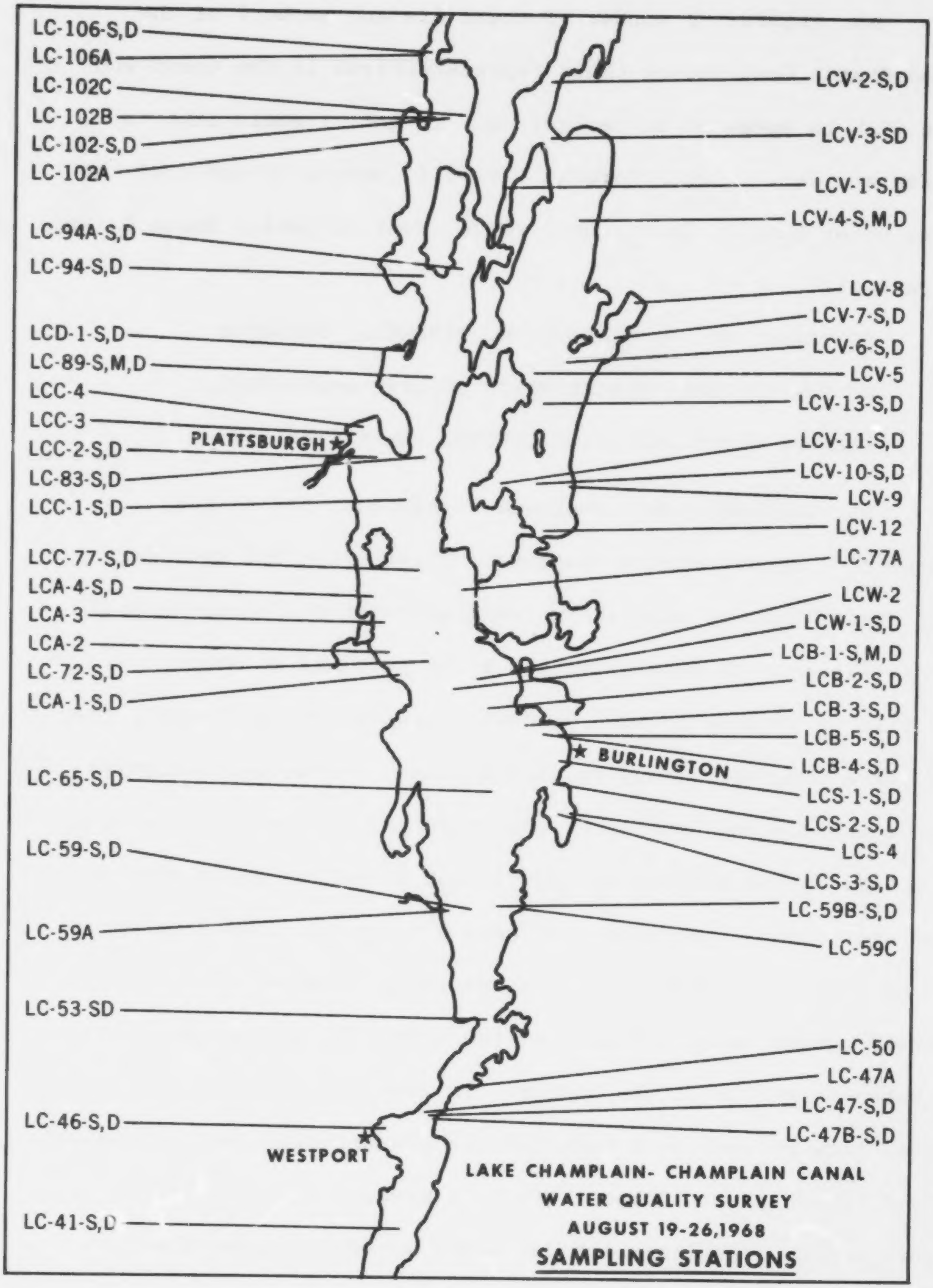

PORT HENRY
LC-36-S,D
LC-36A
LC-36B
LC-35-S,D
LC-30-S,D
LC-26-S,D
LC-24-S-D
LC-22A,B,22-S,D
TICONDEROGA
LC-20.5A,B,20,5-S,D
LC-21A,B,21-S,D
LC-20A,B,20-S,D
LC-18A,B,18-S,D
LC-13.5
LC-10
LC-7
LC-3
LC-0
CC-220
CC-219
WHITEHALL
CC-217
CC-214
CC-209
CC-205
CC-200
CC-194
FORT EDWARD
LAKE CHAMPLAIN-CHAMPLAIN CANAL
WATAR QUALITY SURVEY
AUGUST 19-26,1968
SAMPLING STATIONS
Scale in miles
5
0
5
10

Figure C-1


LC-106-S,D
LC-106A
LC-102C
LC-102B
LC-102-S,D
LC-102A
LC-94A-S,D
LC-94-S,D
LCD-1-S,D
LC-89-S,M,D
LCC-4
LCC-3
PLATTSBURGH
LCC-2-S,D
LC-83-S,D
LCC-1-S,D
LCC-77-S,D
LCA-4-S,D
LCA-3
LCA-2
LC-72-S,D
LCA-1-S,D
LC-65-S,D
LC-59-S,D
LC-59A
LC-53-SD
LC-46-S,D
WESTPORT
LC-41-S,D
LCV-2-S,D
LCV-3-SD
LCV-1-S,D
LCV-4-S,M,D
LCV-8
LCV-7-S,D
LCV-6-S,D
LCV-5
LCV-13-S,D
LCV-11-S,D
LCV-10-S,D
LCV-9
LCV-12
LC-77A
LCW-2
LCW-1-S,D
LCB-1-S,M,D
LCB-2-S,D
LCB-3-S,D
LCB-5-S,D
BURLINGTON
LCB-4-S,D
LCS-1-S,D
LCS-2-S,D
LCS-4
LCS-3-S,D
LC-59B-S,D
LC-59C
LC-50
LC-47A
LC-47-S,D
LC-47B-S,D

LAKE CHAMPLAIN- CHAMPLAIN CANAL
WATER QUALITY SURVEY
AUGUST 19-26,1968
SAMPLING STATIONS

Figure C-2

MR. WALKER: I wonder if there are any members of the United States Congress or their representatives in the group who might wish to speak or be recognized. If not, I would like to proceed and call on Dr. Clarence Tarzwell, who is Director of the Marine Water Quality Laboratory, FWPCA, West Kingston, Rhode Island. Dr. Tarzwell.

STATEMENT OF DR. CLARENCE M. TARZWELL, DIRECTOR OF THE NATIONAL MARINE WATER QUALITY LABORATORY, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

DR. TARZWELL: Mr. Chairman, Conferees, Ladies and Gentlemen, I am Clarence M. Tarzwell, Director of the National Marine Water Quality Laboratory, Federal Water Pollution Control Administration. In discussing pollution problems in Lake Champlain, I propose to talk to you in general terms in order that I may give some background to this problem. We should recognize when we are dealing with water pollution problems that there is a difference in the effects of addition of so-called pollutants to lakes and streams. Because they have a current, streams carry away much of the added waste. In the lakes, however, there is generally quiet water and most of the materials are retained in the water or settle to the bottom. In some lakes, of course, there is some flow through such that the soluble materials may be removed. However, even in such lakes there is a great deal of settling out to form bottom deposits which can exert a very serious effect on the lake environment. Materials which remain suspended in the water cause turbidity which can have two main effects: (1) this turbidity reduces light penetration and thus limits the growth of plankton organisms and rooted aquatics through reductions in the photosynthetic activity and (2) it makes conditions less favorable for those fishes that feed by sight and more favorable for coarse species which are more general feeders on the periphyton. The plankton population of all except the largest streams consists largely of those organisms which have broken loose from the bottom and are floating with the current or those organisms which have entered the stream from a lake or pond. Generally speaking, therefore, clear water which is essential for the promotion of photosynthetic action is not as important in a stream as it is in a lake.

Some might question our interest in clear water and photosynthetic action of the algae because many of our problems are due to enrichment and the eutrophication of lakes. If we add nutrients to a water, I believe it is desirable to promote photosynthetic action of algae in order to add oxygen. If we have turbidity which inhibits the growth of algae, these nutrients will be used by bacteria as they can grow in the dark and even more undesirable problems may be produced, including the depletion of oxygen.

I do not wish to leave the impression, however, that turbidity in streams is desirable or not harmful. Stream sedimentation can be an important problem. In gravel bottom streams, the settling out of silt and other materials and the collection of these materials in the openings between the gravel and rubble greatly reduces food production. It fills in the attachment space for the aquatic insects and other organisms which are important foods of the stream fishes. Many of the finer materials which may be added to streams are carried by the streams and when entering lakes will settle out causing an alteration of the bottom and the covering of areas with the reduction of production of desirable organisms. Bottom areas blanketed with fine silt and organic matter generally produce oligochaetes which may have little value as fish food. I am sure you have all seen the red carpets of tubifex worms in areas that are organically enriched. These grow at the expense of some of the more valuable chironomid larvae although some chironomids can live in these materials at very low oxygen levels. These sediments have an oxygen demand and can be very important in the depletion of dissolved oxygen in the deeper waters, especially those immediately overlying the bottom. The excessive enrichment through the addition of organic materials and the settling out of large plankton populations can so enrich the bottom deposits that dissolved oxygen is used up and anaerobic conditions develop. When this occurs, you can have very serious consequences because under anaerobic conditions more of the nutrients come back into solution.

Analyses of bottom materials of some lakes have shown that there are immense quantities of phosphates in the bottom deposits. If the oxygen levels can be maintained in the deeper waters and anaerobic conditions prevented, these materials will largely remain in the bottom materials and the condition will be such that they are practically removed from the lake. However, if anaerobic conditions develop, there will be a breakdown of these materials in the sediments and they will enter the bottom layers of the waters and at the time of turnover, immense quantities of enriched materials will be circulated throughout the lake. This is the reason why euthrophication is greatly accelerated when oxygen is depleted in the profundal areas. These nutrients returning to the lake waters in addition to those being constantly added will result in great plankton blooms as have been observed in many lakes that have been enriched over a number of years.

Further, it must be realized that in those lakes that are stratified, you really have two lakes. The upper part above the thermocline where there are warm water fishes, and the lower part below the thermocline where the water is cool and if oxygen is present you have the salmonoids, trout, herring, etc. The thermocline is defined as that zone in which there is a drop in temperature of at least 1°C per meter. Very often, there will be a drop of 8-10°F in just a few feet. The thermocline, in other words, is an area of rapid change in temperature with a decreasing temperature as you go down. The area above the thermocline, the epilimnion is that portion of the lake which is wind circulated. Below the thermocline is the hypolimnion, which is not circulated except at the times of turnover in the fall and spring when the lake becomes homothermal or about the same temperature. When the water becomes the same temperature, the density differential is removed and the wind is therefore able to circulate the entire water body. Many of our lakes have warm water fishes in the upper layers and the cold water fishes in the deeper layers. In some, the most valuable fisheries are in the hypolimnium and thus it is the most important area to be protected from increases in temperature. Species such as the lake trout, of course, are very much desired by sportsmen and have high value. In some States, lakes occur fairly far south that have cold waters and cold water species below the thermocline.

Dissolved oxygen is added to the hypolimnium only at the time of the spring turnover and at the fall turnover. Oxygen added at this time must last until the next turnover. Thus, the spring turnover supplies oxygen for the entire summer season; whereas, the fall turnover supplies the oxygen to carry over the winter. It is apparent, therefore, that if this oxygen is to be available over these seasons that organic enrichment must be kept to a minimum. Eutrophication of lakes is accompanied by a gradual decline in the amount of oxygen in the hypolimnium and a direct measure of such euthrophication is the amount of dissolved oxygen present before the overturn in the fall.

Winds are generally stronger in the spring at the time of the spring turnover and in most lakes the wind mixing extends to a depth of about thirty feet. In some of the larger lakes, however, the thermocline may be intermittant or may be much deeper. As the summer advances, there is generally a lowering of the thermocline and a reduction in the size of the hypolimnium with the resultant crowding of the organisms and a greater oxygen demand. It is apparent where we have cold water fishes in the hypolimnium that the temperature in this area must not be increased. Such increases would make conditions unfavorable for the cold water species which may be the most valuable fisheries of the lake and further, increases in temperature increases bacterial action and the utilization of oxygen. With organic enrichment or eutrophication, of course, there is more organic material and more bacterial action with the result that more and more oxygen is used in the hypolimnium. In Lake Erie, a measure of its eutrophication has been the continual lowering of dissolved oxygen in the hypolimnium as indicated by measures in late August and in September before the fall overturn.

In Lake Champlain, available fishery records and such records of temperature as have been taken indicate that there has been a deterioration in the environmental conditions within the hypolimnium. Your lake trout, whitefish, cisco or herring, and also the smelt are important fishes. The salmon, of course, has disappeared. The last one according to records was taken in 1838.

With this brief background, I would now like to comment on the Vermont Class B water quality standards as suggested by the State of Vermont. In general, I think they are good. I believe they are somewhat more restrictive than those of New York State.

Dr. Clarence Tarzwell

I will comment on these suggested water quality requirements and compare them with those suggested by the National Technical Advisory Committee on Water Quality Requirements for Fish, Other Aquatic Life and Wildlife of the Department of Interior. I note that these requirements state that there shall be no floating solids, but settleable solids are not sepcified. The National Technical Advisory Committee gave certain suggested requirements for turbidity and settleable solids as these can become quite important whether they are organic or inorganic. Organic materials such as fibres from paper mills can settle over the bottom to such an extent that they actually paper plate the bottom and render it almost an aquatic desert. As I interpret the Vermont requirements, sludge deposits, garbage, solid refuse, etc. are not allowed. Further, there is to be no grease, oil slicks or scum noticeable to the eye. This is in agreement with National Technical Advisory Committee recommendations which stated that oil should not be present in amounts which would give a colored hue to the surface or cause a sheen on the water.

The Vermont standards state that dissolved oxygen shall not be below 75% of saturation six hours out of a day and shall not be below 5 ppm at any time. Our Committee has suggested that there should be not less than 5 ppm of dissolved oxygen at any time except that during certain critical periods it may range between 4 and 5 ppm for short periods in warm water fish habitats. It was definitely stated that these levels are the minimum which occur only at critical times and that daily and seasonal variations normal for the dissolved oxygen shall be above these levels. This fluctuation is important because oxygen levels cannot be kept constantly at the lower suggested levels if we are to have an adequate well-rounded warm water fish population. It must be clearly stated that these levels are minimal, that they are to occur only at periods of low water and high temperature in the summer months and that normal daily and seasonal fluctuations must be above these minimum levels. If this is not clearly stated, clever manipulation of waste discharges would make it possible to keep dissolved oxygen levels at or near 5 ppm around the clock and day after day. While adult fish can live almost indefinitely at these levels, they cannot complete their life history and growth rate and reproduction would not be satisfactory for many species.

The National Technical Advisory Committee on Aquatic Life Requirements considered color separate from turbidity. It was considered from the standpoint of light penetration and photosynthetic action. The Committee stated that at least 10% of incident light is required for photosynthetic action. Therefore, 10% of incident light should reach the bottom of any desired photosynthetic zone in which adequate dissolved oxygen levels are to be maintained.

In considering taste and odor, the Committee recommended that bioassays should be carried out to determine those concentrations of taste and odor or tainting materials which did not cause a tainting of the fish flesh or the flesh of other edible organisms. I note that the Vermont standards say "none that would impair the use of the aquatic organisms." This is very much in line with the Committee recommendations.

Toxicity does not seem to be an issue in Lake Champlain at the present time. There is a great dirth of knowledge in regard to maximum allowable concentrations of potential toxicants in the aquatic environment. While a great many short-term studies have been made to determine acute toxicities, information on safe levels of toxicants under conditions of continuous exposure are lacking. It would seem desirable that we pass over the subject of toxicity at this time and go directly to temperature.

I note that in the Vermont requirements a $4^{\circ}F$ increase in temperature is allowed. The National Technical Advisory Committee stated in lakes and reservoirs the temperature of the eplimnion in those areas where important organisms are most likely to be adversely affected should not be raised more than $3^{\circ}F$ above that which existed before the addition of heat of artifical origin. The increase should be based on the monthly average of daily maximum temperatures. Further, unless a specific study shows that a discharge of heated effluents into the hypolimnium or pumping water from the hypolimnium for discharge back into the same body of water will be desirable, such practices are not recommended. I feel very strongly that lakes having cold water hypolimniums well supplied with oxygen should not receive heated waters. Thus, discharges of heated waters should be kept near the surface.

It is difficult to formulate one set of requirements which will be suitable for the entire Nation. It was realized that situations in different areas differ and that each area must be considered somewhat individually. In order to do this, the Committee recommended that temperature increases above those that occurred locally so that the increase would apply to local conditions. Thus, the Committee recommended that the 3° rise should be above the monthly average of the daily maximum temperature for that water before the addition of heat of artifical origin. In this way, daily and seasonal fluctuations are maintained and local conditions are taken into consideration. It was further stated, however, that the temperatures should not rise above those which were stated in Table III page 43 of Water Quality Criteria which gives the maximum allowable temperatures for the various species of fishes. Thus, for growth of largemouth bass, drum, bluegills and crappie, the Committee stated that the masimum or peak temperatures should not be greater than 90°F. Again this means that this is a maximum temperature allowable for only short periods and daily and seasonal variations are to be below this maximum temperature. As I understand them the Vermont requirements state that temperature increases shall be not more than 4°F. I believe that this should be clarified. Is this an increase of 4° in the temperature at any time? If it is, it means that it is 4° above the maximum which you might meet on a hot day. If it means 4° above the average temperature, I do not believe it is clearly stated and we would not know exactly how to measure it. It should be made very clear that this 4° rise does not include the total lake. If heated water is added to the hypolimnium and cool water taken out from another area, it is possible to set up a circulation which will circulate the lake and destroy the hypolimnium and those cold water organisms which may be normally living in it. Some thermonuclear plants use tremendous quantities of water, up to one million gallons per minute. Such amounts of water will soon deplete the hypolimnium of a lake. If heated wastes are discharged at the bottom of the epilimnium just above the thermocline, I believe there would be a tendency to erode the thermocline and lower it. Furthermore, you would be spreading heat through the whole mass of the eplimnium and you would be raising the temperature of the entire lake water above the thermocline. If the waste discharge is not more than three feet below the surface, the warm water would stay at the surface and I believe would result in more rapid cooling. The addition of warm water in the spring might cause the thermocline to be formed earlier because there would be a greater density differential set up at an earlier time.

The Vermont requirements state that for cold water streams water should not be above 68°F. It is recognized that if the water does not exceed this temperature and that this is the temperature during those times of peak temperature the water will be good for trout. However, due to the fact that so many of our trout streams have been warmed due to agricultural practices, forest removal, decrease in spring flow and the removal of shade, that many have become nontrout waters and others have had their length of stream suitable for trout drastically shortened. For this reason, the Committee has recommended that there should be no increase in the temperatures of trout streams. All trout streams eventually warm up to such an extent that they cease to be trout streams, unless of course they enter a lake or ocean before they heat up to this extent. Thus, the addition of any warm water to a trout stream can during the season in which temperatures are increasing decrease the length of the trout water. Thus while warming a trout stream might increase the growth locally, it is not considered desirable to add warm water because of the shortening of the area suitable for trout in the lower reaches where the stream is larger. However, if temperatures are kept below 68° and normal daily and seasonal variations are maintained, I feel that streams can be maintained for trout.

For the warm water fishes, the Vermont requirements state that the receiving waters should not be raised above 83°. I believe that this is a very good recommendation. It should be suitable for walleyes, sauger and some of the so-called warm water fishes which usually occur in northern areas.

I have briefly compared the Vermont requirements with those of the National Technical Advisory Committee and have made certain comments in regard to these requirements. I would like to make a few additional comments of a more specific nature on Lake Champlain. There are several basins in the Lake each of which act somewhat like a separate lake. In Malletts Bay, although there is a depth of 100 feet, dissolved oxygen goes down to quite low levels, .34 ppm and carbon dioxide is abnormally high, 12.3 ppm. Fish can acclimate to even greater levels of carbon dioxide if they are given time, but we generally consider that carbon dioxide should not be above 6 ppm in nature under ordinary conditions. Such levels would not be directly lethal, but they are not considered desirable when oxygen levels go as low as .34 ppm. These conditions are really critical and are below those which are desirable for a good warm water game fish habitat. These conditions are a warning of what can develop if there is continued addition of organic materials and nutrients.

The continued addition of organic materials, nutrients and fertilizers, even in moderate amounts, can in time cause undesirable conditions in the largest of the lakes, namely, the Great Lakes. In the smaller lakes, undesirable conditions develop in shorter periods. In Lake Champlain, salmon have disappeared. Lake trout fishing is gone. As indicated in the New York survey report which was published in 1929, there used to be a good lake trout fishery in the Lake Champlain. The whitefish have been greatly reduced. The ciscos are really unknown in quantity because they have not been fished here. Plankton organisms characteristic of the deeper lakes are still present in moderate to small numbers but they are not nearly as abundant as in the other lakes, such as Lake Superior.

In the deep water of Lake Champlain, some of the organisms are the same or similar to those that occur in Lake Superior. These cold water forms have been a valuable resource. Some may feel that a small amount of waste isn't going to do harm, but the continued addition of even small amounts can eventually cause undesirable conditions. The addition of organic materials must be so regulated that they do not exceed the amounts which can readily be metabolized in a normal manner within the lake. The addition of larger amounts tend to cause accumulations in the bottom deposits and eventually these accumulations may lead to undesirable results. Bottom materials should be critically examined as to their content of nutrients and other fertilizing materials. In a stream, you are interested in the nutritive materials in the water. In a lake, you are interested not only in the nutrient materials in the water, but also their presence in the bottom deposits. When a lake has progressed to the point where anaerobic conditions develop over the bottom, nutrients return and with the turnover of the lake you get great enrichment and the production of blue-green algae in large amounts. When this occurs, the public realizes that conditions are bad and that the lake has been seriously damaged. Further when these conditions develop, the most desirable fishes decline drastically or disappear to be replaced by coarse and less desirable species. While you may get greater production in pounds per acre, it is not the type of organisms that are desired by the public.

In a shallow pond having a depth of less than twenty feet, there is generally continuous circulation of the water and productivity is high; such that it produces more pounds per acre than the deeper waters. However, the pond does not produce the kind of fishes that are most desired. The population is made up of bullheads, minnows, suckers, perhaps carp or gar and other less desired species. Thus, a water may produce more pounds per acre, but it is not considered so desirable as one that is not so rich but which produces more of the desirable species. This is why Lake Erie is spoken of as being a dead lake. It is actually producing more pounds of aquatic life per acre but not the kind of organisms which the people desire. If it does not produce what the people want, it is considered to be ruined. It is to be hoped that Lake Champlain does not reach this stage.

MR. KLASHMAN: Thank you, Dr. Tarzwell. Dr. Tarzwell, could you just stay up here just a minute? Do you have any questions, Mr. Haberer?

MR. HABERER: No.

MR. KLASHMAN: Mr. Peloquin.

MR. PELOQUIN: No.

MR. KLASHMAN: Mr. Walker.

MR. WALKER: No.

MR. KLASHMAN: Mr. Thieme.

MR. MILLER: Now, may I ask my questions?

MR. THIEME: Mr. Chairman, Mr. Miller is a member of the Vermont Water Resources Board and I would ask that he be permitted to join me as a Conferee in these proceedings.

MR. KLASHMAN: Mr. Miller, since you are a member of the Board you are joining the Conference as a Conferee because our procedures do not permit questions from the floor. So, as a Conferee, will you ask your questions?

MR. MILLER: Thank you, Mr. Chairman.

Dr. Tarzwell, with respect to this three degrees temperature addition, this recommendation is one degree less than the existing Vermont standards, is that correct?

DR. TARZWELL: That is correct, Mr. Miller. However, it could mean more than that. Without specifications as to what the four degrees means as to whether it's four degrees above the average temperature or four degrees above the maximum temperature or four degrees above the monthly average of the daily maximum makes a considerable difference. Further it is not specified that the daily and seasonal variation shall be normal. Also, its meaning depends upon how much variation you have in the maximum temperature of the lake. The approach of the National Technical Advisory Committee has been of allowing the maximum temperature at any time or place to be a certain number of degrees above the monthly average of the daily maximum. For example, let us say that the maximum temperature for a month was 88° and the lowest of the maximum temperatures was 84°. If these maximum temperatures were evenly distributed between these two extremes, then the monthly average of the daily maximum would be 86°. Thus, with the addition of three degrees, your maximum temperature would be 89°. However, if you allowed four degrees above the maximum temperature, your maximum allowable temperature would be 92°. This is a difference of three degrees. Do you follow my reasoning?

MR. MILLER: Yes, but this leads up to a statement I would like to make and then I would like you to comment on it. As a result of our experience with the Connecticut River in the Vernon atomic plant, I think it is fair to say that the Vermont Water Resources Board, all three of us, came to the conclusion that any addition of heated effluent or heated water to receiving waters that was at its maximum summer temperature, if we heated that, if the receiving water was at its maximum temperature, and if, indeed, we then heated that further, we felt that we were producing effects that were adverse to the water quality and, therefore, that that was pollutious. In making this we have presented certain ideas and received the advice of our Commissioner and this has been circulated to the New England Interstate Pollution Control Commission and to the Federal pollution people and I would like you to comment on that position as far as your experience goes in this area.

DR. TARZWELL: With regard to trout streams or headwaters of streams that contain salmon and trout, the Committee recommended that no heat would be added. Thus for cold water salmonoids we suggested that no heat should be added and I think that is what you are asking.

MR. MILLER: I am saying, hot or cold, if this represents a fishery or, indeed, if it does not, but actually it is specifically with respect to a fishery. If you add heat to water when that receiving water is at its maximum temperature, the addition of hotter water is producing, in my view, and I think the other two members of the Board, effects that are adverse to that water quality and, therefore, are legally pollutious.

DR. TARZWELL: That is correct. Our approach to the situation was this: If the peak temperature is not a critical temperature and occurs for only a short time - fish can resist it. However, if this peak temperature is above the temperature that we suggested for different species of fishes in Table III page 42, Report of the Committee on Water Quality Criteria, the temperature must not be increased. If the water temperature is already at that level, the recommendations for allowable temperature increases do not apply, that you cannot add additional heat.

MR. MILLER: Thank you very much. You have raised a lot of other questions as well but time does not permit us to go into them. Thank you very much, Dr. Tarzwell.

MR. KLASHMAN: Mr. Thieme, I think there is someone from Vermont that wants to make a statement. May I suggest that if you want to make a statement you speak to the New York representative?

FROM THE FLOOR: I have some questions in writing if I could be made a Conferee and I only want to ask one brief question. My name is Peter Paine and I am general counsel for the Lake

Champlain Committee and I wrote to you, Mr. Haberer.

MR. HABERER: Yes, I have your name here and I will call on you when the New York State group speaks.

MR. PAINE: What I would like to ask is -- excuse me.

MR. KLASHMAN: Excuse me. We will call on you, if you don't mind. Thank you. I am sorry to be sticky about this, but this has happened in the past and from experience I know we can be here all night.

Mr. Walker.

MR. WALKER: I have a communication from Mark Abelson, who is Regional Coordinator for the Northeast Region of the U. S. Department of the Interior. He has submitted a statement for the record and requests that it be included, without reading, at this time.

MR. KLASHMAN: It shall be so done. I have a similar communication from Frank Panuzio, Chief of the Engineering Division of the New York District Corps of Engineers and he has prepared a statement and requests that it be included in the record, without reading, at this time.

Mr. Thomas Schraeder of the Fish and Wildlife Service, Department of the Interior, had planned on making a statement at the Conference but he ran afoul of the snowstorm and was not able to make it and he will be submitting a statement for the record at a later date.

Is there anyone here from the Public Health Service?

The Public Health Service had indicated that they would like to make a statement, but neither one of the gentlemen is here. I presume they were held up by the storm and probably will be submitting a statement for the record at a later time.

STATEMENT OF MARK ABELSON, REGIONAL COORDINATOR, NORTHEAST REGION, U. S. DEPARTMENT OF THE INTERIOR

MR. ABELSON: I am Mark Abelson, Regional Coordinator, for the Northeast Region, United States Department of the Interior.

The Department of the Interior is the Nation's primary agency charged with the responsibility for a wide variety of programs for the management, conservation, and development of the natural resources benefiting every section of the Nation. For this reason, Interior can best be described as the "Department of Natural Resources."

The Department is made up of some two dozen bureaus and offices, whose functions and responsibilities cover the entire range of natural and human resources. In the Northeast coordination of these functions and responsibilities is accomplished through my office in Boston.

In carrying out our vital responsibilities for sound management of natural resources, the Department encourages efficient resources use; works to assure that a sound resource base is provided to meet the needs of our expanding economy and our national security; promotes an equitable distribution of benefits from nationally-owned resources; and seeks to prevent wasteful exploitation of resources.

The Department has a definite interest in all waters of the country and in the entire pollution problem.

Water, and its associated opportunities and problems, ignores State, regional and international boundaries. It is necessary that these interrelationships of water be so recognized, and that the efforts of all concerned plan for the best use of this valuable resource.

The focus of Interior efforts is directed to the maintenance of adequate water supplies and adequate water quality for whatever uses man may wish to make of this resource. The Department approach emphasizes the coordination and interrelation between uses and the effect of these uses on management and the quality of the total water supply system. We hope we can keep the country as an affluent, not an effluent, society.

Maintenance of water quality involves not only the quality not only the quality levels of human consumption, but also quality levels for consumption by other animal and plant life, for development of other natural resources, and for industrial processes. These quality considerations are interrelated. They can be understood and controlled best from the point of view of water as a resource, rather than of a particular quality need.

Interior Bureaus, in addition to the Water Pollution Control Administration, carry on water quality studies related to the physical, chemical, and biological adequacy of our water resources. These studies and the associated research are chiefly those in which the skills and required knowledge are based on geology, chemistry, hydrology, engineering, and other physical science aspects of water management. Interior water quality research extends beyond water supply to the study of environments adequate for the propagation, production, and control of both fish and wildlife resources, and for water-based recreation.

In conclusion, I would like to say that we urge that steps be taken to eliminate from Lake Champlain Basin those domestic and industrial pollutants which detract from the full public enjoyment of the aquatic resources of these areas.

Statements will be presented here today by representatives of the following Bureaus of the Department which have varying responsibilities in the Region under consideration: Fish and Wildlife Service for the Bureau of Sports Fisheries and Wildlife and the Bureau of Commercial Fisheries. Bureau of Outdoor Recreation will submit a statement in a few days for insertion into the record.

Thank you.

STATEMENT OF FRANK PANUZIO, CHIEF OF THE ENGINEERING DIVISION OF THE NEW YORK DISTRICT CORPS OF ENGINEERS

The Corps of Engineers has three areas of responsibility which are pertinent to the problem of pollution in Lake Champlain. These relate to (1), water resources development, (2), Army and Air Force facilities and installations, and (3), certain Federal water pollution control statutes.

The first area of responsibility arises from the fact that the Corps of Engineers of the Department of the Army is designated by law as the Federal agency responsible for water resources planning and for construction and operation of Federal works for navigation, flood protection and beach erosion purposes. There are two studies of the Corps which are closely related to the pollution problem in the Lake Champlain area. These are being coordinated with all interested agencies who are working in the water resources field. The first of these is the North Atlantic Regional Water Resources Study covering all river basins draining into the Atlantic Ocean north of the Virginia-North Carolina State line, portions of Lake Champlain and the St. Lawrence River. This is one of the eighteen regions of the United States delineated in the Water Resources Council program of water resources studies to establish a framework or broad master plan to serve as a basis for future multipurpose water resource development in the area. This study is a joint effort of Federal agencies involved in the water resource development and those States whose interests are involved.

As a result of the recent uprecedented water drought over the northeastern seaboard of the Nation. Congress has authorized the Corps of Engineers to cooperate with all Federal, State and local agencies in preparing plans to meet the longrange water needs of the northeastern United States. These plans may include major reservoirs, conveyance facilities to transfer water between river basins and purification facilities to be constructed under Federal auspices with non-Federal participation. The area covered by this study is generally similar to the area covered by the previously mentioned framework study.

The second area of responsibility is related to the abatement of pollution which may arise from Army and Air Force bases and from vessels which the Corps of Engineers operates in connection with its navigation responsibilities. The Corps of Engineers is proceeding with the development of the plans for the treatment of waste discharged to water tributary to Lake Champlain. Also, it is equipping its vessels with chlorinators to minimize pollution from this source.

The third area of responsibility is related to enforcement of certain Federal statutes developed to assure freedom of waterways for navigation.

The most general law associated with pollution, enforced by the Corps of Engineers and applicable to Lake Champlain, is Section 13 of the River and Harbor Act of 3 March 1899, known as the Refuse Act, which states in essence that it is unlawful to throw, discharge or deposit any refuse matter of any kind or description into navigation waters of the United States. In the broad sense under this statute water pollution is not unlawful unless it is injurious to navigation.

The Oil Pollution Act of 1924, as amended by the Clean

Water Restoration Act of 1966, prohibits the discharge of oil from any boat or vessel into or upon the navigable waters of the United States. The Clean Water Restoration Act contains four significant differences from the Act of 1924: (1) It transfers jurisdiction from the Secretary of the Army to the Secretary of the Interior (this was in turn delegated to the Federal Water Pollution Control Administration); (2) in order to prosecute violators, it must be proved that the oil spill was caused by gross negligence or willful spilling; (3) it extends the 1924 Act from tidal waters to all navigable waters; (4) it requires that the violators clean up oil spills. Since it is difficult to prove "gross negligence" or "willful spilling," there are presently before the Congress bills which would remove the requirements that gross negligence or willful spilling be shown. In the meantime, pollution violations originating from boats or vessels are processed by the Secretary of the Army, in coordination with the FWPCA and the U. S. Coast Guard, under authority derived from Section 13 of the Act of 3 March 1899 which I previously mentioned.

To enforce these statutes, the Corps of Engineers operates patrol vessels and patrol cars. When a violation is observed or reported, it is present policy that we inform the violator of the statute that he is violating and for a first offense solicit compliance. If correction is not effected within a reasonable time, a report is forwarded to the appropriate U. S. Attorney of the Admiralty and Shipping Section of the U. S. Department of Justice with a request that legal action be taken against the offender.

As a part of the preventive program, we distribute notices of court fines to newspapers.

Again, under statutes originally enacted by Congress for the protection and preservation of navigable waters of the United States, the District, after appropriate public notice, investigation and study, issues permits authorizing work or construction, in, across and under navigable waterways. While formerly we concerned ourselves primarily with assuring the public rights of navigation and that no unreasonable obstruction to navigation would be created we now seek to assure that recent statutes for the preservation of fish and wildlife resources and water quality control are also satisfied by exercising close coordination with local, State and Federal agencies having jurisdiction in these matters. Applications for permits for work are also coordinated with the United States Department of the Interior under Public Law 89-605, and with the Lake Champlain Commission.

MR. WALKER: I have two other prepared statements submitted for the record.

Statement of the U. S. Fish and Wildlife Service Concerning Pollution of Lake Champlain

Burlington, Vermont
November 13, 1968

The Bureau of Sport Fisheries and Wildlife and the Bureau of Commercial Fisheries are vitally concerned with the various aspects of fish and wildlife conservation and development within Lake Champlain. Our concern reflects both the specific and the general interest of the Congress in conservation of the Nation's fish and wildlife resources. The general policy of the federal government is expressed in these words quoted from the Fish and Wildlife Act of 1956, "The Congress hereby declares that the fish, shellfish, and wildlife resources of the Nation make a material contribution of our nation's economy and food supply, as well as a material contribution to the health, recreation, and well-being of our citizens; that such resources are a living renewable form of national wealth that is capable of being maintained and greatly increased with proper management; but equally capable of destruction if neglected or unwisely exploited; that such resources afford outdoor recreation throughout the Nation and provide employment, directly or indirectly, to a substantial number of citizens."

Important fish and wildlife resources are found in the Lake Champlain area. The waterfowl resources are of regional, national, and international significance. The area constitutes one of the most significant inland waterfowl habitat complexes found in the northeastern United States. Lake Champlain and the Hudson River are one of the three vital waterfowl migration routes in the mid-section of the Atlantic Flyway. Waterfowl from Greenland, the Arctic Sea islands, the shores of Hudson Bay, and the Maritime Provinces of Canada funnel through the Lake Champlain-Hudson River route during migrations. This area is used for feeding and resting by spring and fall migrants. Important species include black duck, scaup, goldeneye, mallard, wood duck, and canvasback. In addition, the suitable marsh habitat is heavily used for breeding purposes. Black duck, wood duck, and mallard are important breeding species. It is interesting to note that there has been a steady build-up of canvasback ducks in the Champlain area in recent years and the Vermont Fish and Game Department now counts up to 700 canvasbacks on the inventory flights. This is in contrast to continental populations of canvasbacks which have declined in recent years to the point that hunting for this species has been prohibited or severely restricted.

The importance of the Lake Champlain marshes is accentuated by the proximity of the bordering mountains. Physiographic conditions limit desirable waterfowl habitat to the lake and contiguous areas.

Vermont has invested approximately a million dollars in the 7,000 acres under active management for waterfowl on or near Lake Champlain. The important state waterfowl management areas are: (1) Dead Creek Refuge located on Dead Creek in the towns of Addison, Panton and Bridport; (2) Sandbar Refuge located at the mouth of the Lamoille River in Milton; (3) Mud Creek Refuge in Alburg; (4) Little Otter Creek Refuge in Ferrisburg; and (5) East Creek Refuge in Orwell and Benson.

The Mississquoi National Wildlife Refuge is located in Vermont on the Mississquoi River delta in Swanton. Both Vermont and New York have been actively developing waterfowl marshes contiguous to the lake. Important waterfowl areas in New York include Ausable Marsh, Wickham Marsh, Kings Bay, Monty's Bay, Scomotion Creek, and Bulwagga Bay, some of which are State-owned or being acquired or are planned for future acquisition.

The marshes along the lake also support an abundance of wildlife other than waterfowl. Muskrats are the most important of these species. In the past, some marshes have been privately developed for muskrat management on a commercial basis.

While there is no significant commercial fishery resource in Lake Champlain, we are certainly concerned about the conservation and development of the fishery resources of the area. The Bureau of Commercial Fisheries is cooperating in a modest Federal Aid project with the State of Vermont to determine the commercial fishery potential of Lake Champlain.

A biological survey of Lake Champlain conducted by the State of New York in 1929 identified 52 different species of fish in the lake. The northern pike, chain pickerel, walleye, largemouth bass, smallmouth bass, yellow perch, and American smelt are the most important game species. The Vermont shoreline is particularly significant in maintaining the high value lake fishery because of the use made of this area by walleye and northern pike for spawning purposes.

Walleye fishing reaches a peak in the spring when these fish are concentrated in the mouths and lower reaches of the major rivers. Mississquoi and Lamoille Rivers have outstanding walleye fishing. Bass in Lake Champlain offer much sportfishing. Yellow perch, chain pickerel, and northern pike are taken in both summer and winter. Yellow perch compose the bulk of the winter catch. Smelt are of importance only during the winter period and the catch is limited mainly to central and northern portions of the lake. A major smelt spawning area exists in water about 10 feet deep on the New York side between Port Henry and the Crown Point Bridge.

Considering present and future needs for food supplies and recreational opportunities, this Service believes that the necessary control of pollution will yield attractive benefits from fishing and hunting recreation and many other uses.

U. S. Public Health Service
Statement on the Health Aspects
of Pollution of the Interstate
Waters of Lake Champlain and its
Tributary Basin (New York - Vermont)
November 13, 1968

Statement on the Health Aspects of Pollution of the Interstate Waters of Lake Champlain and its Tributary Basin (New York - Vermont)

The Public Health Service's interest in the pollution of Lake Champlain stems from two areas. Water pollution continues to be a primary interest of this department because of our health responsibilities under Section 2k of the Federal Water Quality Act of 1965. When the Federal Water Pollution Control Administration was transferred from this Department to the Department of the Interior, an Interdepartmental Agreement was established between the two Departments in accordance with Section 1(f) of the Reorganization Plan Number 2 of 1966. Since the Interdepartmental Agreement was signed by the President on September 1, 1966, this Department has acted in accordance with the agreement by consultations with the Secretary of the Interior on the public health aspects of water pollution. The Public Health Service certifies water supplies used aboard interstate carriers. Two interstate carrier water supplies utilize Lake Champlain as a source of supply.

In evaluating the health aspects of water pollution a number of areas are considered, - the effects of pollution on shellfish growing areas, the effects of pollution caused by solid waste disposal, the effects of pollution on the suitability of an area for recreation, and the effects of pollution on the suitability of water for public water supply. Of these, the latter two are of primary interest in this case.

In evaluating the health aspects of water pollution the "Report of the Technical Advisory Committee on Water Quality Criteria" and the "Health Guidelines for Water Resources and Related Land Use Management" are used. In these, specific guidelines and criteria for the various uses of a water resource are stated.

Water Supply - Guidelines for public water supply are contained in Appendix I. Briefly, the guidelines state that water used without treatment must meet requirements of the 1962 Public Health

Service Drinking Water Standards. If a water supply does not meet these requirements, treatment must be provided. This could include simple chlorination or an elaborate treatment facility. The two interstate carrier water supplies using Lake Champlain as a source of supply (Burlington, Vermont, and Rouses Point, New York) provide treatment ranging from chlorination and sand filtration at Burlington to chlorination and diatomaceous earth filtration at Rouses Point. The quality of water served by both supplies meets requirements of the Drinking Water Standards. This is also true for the other communities which utilize Lake Champlain as a source of water supply, indicating that pollution of Lake Champlain does not preclude its use as a public water supply in most areas.

Recreation - Guidelines used in the evaluation of a water supply from the recreation standpoint cover biological, chemical and physical quality. The criteria used for body contact recreation such as swimming or water skiing is as follows:

Coliform - The fecal coliform density should not exceed a geometric mean of 200 per 100 m/l.

Chemical - The water should contain no chemical which could cause toxic reaction if ingested or irritation to the skin or eye.

Physical - The water's color should not exceed 15 standard units and its turbidity should not exceed 30 standard units. Clarity should be such that Secchi disc is visible at a minimum depth of 4 feet.

Based on data obtained by the Federal Water Pollution Control Administration it can be seen that the water in various areas of Lake Champlain does not meet the above criteria. Failure to meet the above criteria is particularly noticeable in the lower portion of the lake, specifically, from about mile 20 below Ticonderoga, to about mile 22 above Ticonderoga, and also in the vicinity of Whitehall. The color criteria is not met at all until mile 47 with extremely high values, i.e., over 50 units observed in the above mentioned mile 20-22 area. The fecal coliform criteria for body contact recreation is not met in the vicinity of Whitehall and in the mile 20-22 area. The transparency criteria is not met until about mile 30 with particularly low transparency observed in the mile 0 - 10 area.

The pleasant enjoyment of water-based recreation is a positive benefit to health.

Recreation and particularly body contact recreation is a significant use of Lake Champlain and the unsuitability of the lower end of Lake Champlain for this use constitutes a detriment to health. The unpleasant condition in this area precludes its use for body contact recreation by most people thus causing a waste of a valuable resource. The Public Health Service recommends that all possible action be taken to eliminate the detrimental sources of pollution on Lake Champlain with the aim towards restoring areas of the lake to beneficial use and thereby improving the health of those who use the lake.

HEALTH GUIDELINES FOR WATER RESOURCE AND RELATED LAND USE MANAGEMENT

USPHS, DHEW
March 1968

PART I: WATER QUALITY FOR DOMESTIC AND FOOD PROCESSING USES

USPHS, DHEW
March 1968

PART I: WATER QUALITY FOR DOMESTIC AND FOOD PROCESSING USES

INTRODUCTION

Part I is the first of a series of health guidelines for water resource and related land use management which have been prepared for the guidance of Federal and other agencies concerned with the development of the Nation's water and related land resources. The guidelines are intended to roughly define those factors of public health significance in water resource and related land use management. Active consultation and cooperation with concerned health agencies will assure adequate consideration of these factors. In considering these guidelines it must be noted that they are based upon available information and are subject to review and modification as new information becomes available.

It should be recognized that guideline contaminant levels constitute only one of several health protection tools. Before waters in any one geographic location can be considered safe for any of the various human uses at least two additional facets should be considered.

1. Sanitary Survey: As examples, low contaminant levels can mask an intermittent but potentially hazardous pollution source; or special geologic features can provide a short-circuit pathway for quick pollution travel from a source to wells used for community purposes. A sanitary survey made by qualified public health authorities is needed to reveal these and other hazardous possibilities in the health consideration of specific waters.

2. Epidemiology: As a third facet in the trilogy of health checks, epidemiology will indicate whether identifiable disease occurrences have been associated with specific waters. Initially such an assessment will depend upon existing records. Plans should be made however for the systematic recording of pertinent data and the epidemiological assessment should be of a continuing or periodic nature routinely done by health authorities.

For waters to be considered safe from a health standpoint, a satisfactory finding must be made on water quality levels; and the sanitary survey and epidemiology must reveal no serious hazards or disease occurrence. On the other hand, negative findings on any one of the three aspects, would raise serious health questions with regard to the use of specific waters for human purposes.

WATER QUALITY FOR DOMESTIC AND FOOD PROCESSING USES

To be considered safe from a health standpoint, the subject waters should meet indicated criteria for quality, and be judged safe on the basis of a sanitary survey and an epidemiological assessment. Water for food processing should meet the same requirements as water for domestic use; however, where food processing may concentrate contaminants or otherwise change the nature of contaminants, additional and stricter requirements may be needed as determined by health authorities.

A. Public Health Service Drinking Water Standards - 1962

As part of its responsibilities under the Public Health Service Act, the Public Health Service has developed over the years and kept up-to-date the subject standards for potable water used by carriers subject to the Federal Quarantine Regulations. These standards constitute the essential baseline for health criteria with respect to water quality for domestic and food processing uses. They also serve as an important reference point for health criteria with respect to water quality for other uses.

In as much as the PHS Drinking Water Standards are referred to a number of times in this Guideline, they are included in updated form as Appendix I.

B. Quality of Untreated Raw Ground Water for Domestic and Food Processing Uses

a) Bacteriological: Should meet Public Health Service Drinking Water Standards (Appendix I)
b) Physical: Should meet Public Health Service Drinking Water Standards (Appendix I)

c) Chemical: **Chemicals** present should not exceed the following concentrations:

Substance	Concentration (mg/l)
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (B)	1.0
Cadmium (Cd)	0.01
Carbon Chloroform Extract (CCE)	0.2
Chloride (Cl)	250
Chromium (hexavalent, Cr^{+6})	0.05
Copper	1.0
Cyanide (CN)	0.01
Detergents (Methylene Blue Active Substances)	0.5
Fluoride (F)	
50.0-58.3*°F	1.8
58.4-70.6*°F	1.5
70.7-90.5*°F	1.2
Iron (Fe)	0.3
Lead (Pb)	0.05
Manganese (Mn)	0.05
Nitrogen (in nitrate or nitrite form)	10.0
Phenols	0.001
Selenium (Se)	0.01
Silver (Ag)	0.05
Sulfate (SO_4)	250
Total Dissolved Solids	500
Uranyl Ion (UO_2^{++})	5.0
Zinc (Zn)	5.0

Substances not included in the above table which may have deleterious physiological effect or which may be excessively corrosive to the water supply system should not be permitted in the raw water supply.

d) Radioactivity: Should meet Public Health Service Drinking Water Standards **(Appendix I)**

e) Pesticides: Should not exceed the following limits:

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* Annual average of maximum daily air temperatures.

	Pesticide	Maximum Permissible Concentration *mg/l
1.	Endrin	0.001
2.	Aldrin	0.017
3.	Dieldrin	0.017
4.	Lindane	0.056
5.	Toxaphene	0.005
6.	Heptachlor	0.018
7.	Heptachlor Epoxide	0.018
8.	DDT	0.042
9.	Chlordane	0.003
10.	Methoxychlor	0.035
11.	Total Organophosphorous and Carbamate Compounds (expressed in terms of Parathion Equivalent Cholinesterase inhibitions)	0.1
12.	2,4,5-TP	Individual limits = 0.1 mg/l. Sum of any combination of chlorinated phenoxy alkyl pesticides = 0.1 mg/l.
13.	2,4,5-T	
14.	2,4-D**	

C. Quality of Raw Water, Treatment by Disinfection Only, For Domestic and Food Processing Uses

a) This water should meet all of the requirements for Physical, Chemical, Radioactivity, and Pesticides as shown for untreated raw ground water in sections B. b, B. c, B. d, and B. e respectively.

b) Bacteriological:

1) Coliform Group: Less than 100/100 ml. as measured by a monthly arithmetic mean.

2) Fecal Coliform: If fecal coliform density is measured, the above total coliform density may be exceeded, but fecal coliform density should not exceed 20/100 ml. as measured by a monthly arithmetic mean.

D. Quality of Raw Water, Treatment by Complete Conventional Means Including Coagulation, Sedimentation, Rapid Sand Filtration, and Disinfection, for Domestic and Food Processing Uses

a) Bacteriological:

1) Total Coliform Density: Less than 20,000/100 ml. as measured by a monthly geometric mean or,

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* For long-term exposure

**Short period limit only - two to three days, no more than once or twice a year.

2) Fecal Coliform Density: If fecal coliform density is measured, the above total coliform density may be exceeded but fecal coliform should not exceed 4,000/100 ml. as measured by a monthly geometric mean.

b) Physical: Elements of Color, Odor, and Turbidity contribute significantly to the treatability and potability of the water.

Color - - - - - - - - - - - - 75 color units

(This limit applies only to non-industrial sources; industrial concentrations of color should be handled on a case-by-case basis and should not exceed levels which are treatable by complete conventional means.)

Odor - - - - - - - - - - - - - 5 threshold numbers

Turbidity - - - - - - - - - - Variable

(Factors of nature, size, and electrical charge for the different particles causing turbidity require a variable limit. Turbidity should remain within a range which is readily treatable by complete conventional means; it should not overload the water treatment works; and it should not change rapidly either in nature or in concentration where such rapid shifts would upset normal treatment operations.)

c) Chemical:

1) Since complete conventional treatment generally produces little reduction in chemical constituents, raw water should meet the limits given in section B. c of this Guideline. Minor deviations can be considered on an individual basis for such chemicals as iron and manganese, when the water supply treatment process will reduce the chemical concentration in the finished water to or below the specified limit.

d) Radioactivity: Should meet Public Health Service Drinking Water Standards.

e) Pesticides: Should meet requirements for Pesticides as shown for untreated raw ground water in section B. e.

APPENDIX I

PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS—1962[1]

Standards promulgated by the Public Health Service, U. S. Department of Health, Education, and Welfare, Effective April 5, 1962, for potable water used by carriers subject to the Federal Quarantine Regulations

(Superseding Standards adopted February 6, 1946)[2]

1. Definition of Terms

The terms used in these Standards are as follows:

1.1 Adequate protection by natural means involves one or more of the following processes of nature that produces water consistently meeting the requirements of these Standards: dilution, storage, sedimentation, sunlight, aeration, and the associated physical and biological processes which tend to accomplish natural purification in surface waters and, in the case of ground waters, the natural purification of water by infiltration through soil and percolation through underlying material and storage below the ground water table.

1.2 Adequate protection by treatment means any one or any combination of the controlled processes of coagulation, sedimentation, absorption, filtration, disinfection, or other processes which produce a water consistently meeting the requirements of these Standards. This protection also includes processes which are appropriate to the source of supply; works which are of adequate capacity to meet maximum demands without creating health hazards, and which are located, designed, and constructed to eliminate or prevent pollution; and conscientious operation by well-trained and competent personnel whose qualifications are commensurate with the responsibilities of the position and acceptable to the Reporting Agency and the Certifying Authority.

1.3 Certifying Authority means the Surgeon General of the U. S. Public Health Service or his duly authorized representatives. Reference to the Certifying Authority is applicable only for those water supplies to be certified for use on carriers subject to the Public Health Service Regulations—(42 CFR Part 72).

1.4 The coliform group includes all organisms considered in the coliform group as set forth in Standard Methods for the Examination of Water and Wastewater, current edition, prepared and published jointly by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

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[1] Including additions and changes adopted by the Public Health Service Advisory Committee on Use of the Public Health Service Drinking Water Standards in June of 1967.

[2] Public Health Reports 61:371-384, March 15, 1946.

1.5 Health hazards mean any conditions, devices, or practices in the water supply system and its operation which create, or may create, a danger to the health and well-being of the water consumer. An example of a health hazard is a structural defect in the water supply system, whether of location, design, or construction, which may regularly or occasionally prevent satisfactory purification of the water supply or cause it to be polluted from extraneous sources.

1.6 Pollution, as used in these Standards, means the presence of any foreign substance (organic, inorganic, radiological, or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness of the water.

1.7 Reporting Agencies means the respective official State health agencies or their designated representatives.

1.8 The standard sample for the bacteriological test shall consist of:

1.81 For the bacteriological fermentation tube test, five (5) standard portions of either:
(a) ten milliliters (10 ml)
(b) one hundred milliliters (100 ml)

1.82 For the membrane filter technique, not less than fifty milliliters (50 ml).

1.9 Water supply system includes the works and auxiliaries for collection, treatment, storage, and distribution of the water from the sources of supply to the free-flowing outlet of the ultimate consumer.

2. Source and Protection

2.1 The water supply should be obtained from the most desirable source which is feasible, and efforts should be made to prevent or control pollution of the source. If the source is not adequately protected by natural means, the supply shall be adequately protected by treatment.

2.2 Frequent sanitary surveys shall be made of the water supply system to locate and identify health hazards which might exist in the system. The manner and frequency of making these surveys, and the rate at which discovered health hazards are to be removed, shall be in accordance with a program approved by the Reporting Agency and the Certifying Authority.

2.3 Approval of water supplies shall be dependent in part upon:
(a) Enforcement of rules and regulations to prevent development of health hazards;
(b) Adequate protection of the water quality throughout all parts of the system, as demonstrated by frequent surveys;
(c) Proper operation of the water supply system under the responsible charge of personnel whose qualifications are acceptable to the Reporting Agency and the Certifying Authority;

(d) Adequate capacity to meet peak demands without development of low pressures or other health hazards; and
(e) Record of laboratory examinations showing consistent compliance with the water quality requirements of these Standards.

2.4 For the purpose of application of these Standards, responsibility for the conditions in the water supply system shall be considered to be held by:

(a) The water purveyor from the source of supply to the connection to the customer's service piping: and
(b) The owner of the property served and the municipal, county, or other authority having legal jurisdiction from the point of connection to the customer's service piping to the free-flowing outlet of the ultimate consumer.

3. Bacteriological Quality

3.1 Sampling

3.11 Compliance with the bacteriological requirements of these Standards shall be based on examinations of samples collected at representative points throughout the distribution system. The frequency of sampling and the location of sampling points shall be established jointly by the Reporting Agency and the Certifying Authority after investigation by either agency, or both, of the source, method of treatment, and protection of the water concerned.

3.12 The minimum number of samples to be collected from the distribution system and examined each month should be in accordance with the number on the graph in Figure I, for the population served by the system. For the purpose of uniformity and simplicity in application, the number determined from the graph should be in accordance with the following: for a population of 25,000 and under--to the nearest 1; 25,001 to 100,000--to the nearest 5; and over 100,000--to the nearest 10.

3.13 In determining the number of samples examined monthly, the following samples may be included, provided all results are assembled and available for inspection and the laboratory methods and technical competence of the laboratory personnel are approved by the Reporting Agency and the Certifying Authority:

(a) Samples examined by the Reporting Agency.
(b) Samples examined by local government laboratories.
(c) Samples examined by the water works authority.
(d) Samples examined by commercial laboratories.

3.14 The laboratories in which these examinations are made and the methods used in making them shall be subject to inspection at any time by the designated representatives of the Certifying Authority and the Reporting Agency. Compliance with

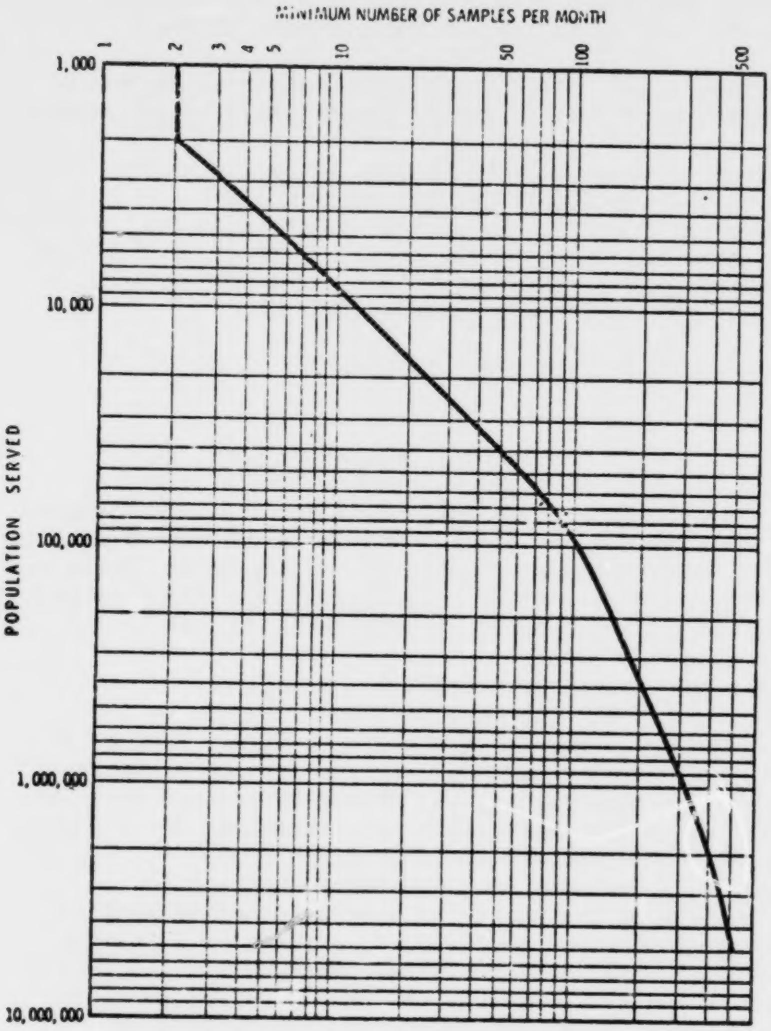

Figure 1

the specified procedures and the results obtained shall be used as a basis for certification of the supply.

3.15 Daily samples collected following a bacteriologically unsatisfactory sample as provided in sections 3.21, 3.22, and 3.23 shall be considered as special samples and shall not be included in the total number of samples examined. Neither shall such special samples be used as a basis for prohibiting the supply, provided that: (1) When waters of unknown quality are being examined, simultaneous tests are made on multiple portions of a geometric series to determine a definitive coliform content; (2) Immediate and active efforts are made to locate the cause of pollution; (3) Immediate action is taken to eliminate the cause; and (4) Samples taken following such remedial action are satisfactory.

3.2 Limits—The presence of organisms of the coliform group as indicated by samples examined shall not exceed the following limits.

3.21 When 10 ml standard portions are examined, not more than 10 percent in any month shall show the presence of coliform group. The presence of the coliform group in three or more 10 ml portions of a standard sample shall not be allowable if this occurs:

(a) In two consecutive samples;
(b) In more than one sample per month when less than 20 are examined per month; or
(c) In more than 5 percent of the samples when 20 or more are examined per month.

When organisms of the coliform group occur in 3 or more of the 10 ml portions of a single standard sample, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

3.22 When 100 ml standard portions are examined, not more than 60 percent in any month shall show the presence of the coliform group. The presence of the coliform group in all five of the 100 ml portions of a standard sample shall not be allowable if this occurs:

(a) In two consecutive samples;
(b) In more than one sample per month when less than five are examined per month; or
(c) In more than 20 percent of the samples when five or more are examined per month.

When organisms of the coliform group occur in all five of the 100 ml portions of a single standard sample, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

3.23 When the membrane filter technique is used, the arithmetic mean coliform density of all standard samples examined per month shall not exceed one per 100 ml. Coliform colonies per standard sample shall not exceed 3/50 ml, 4/100 ml, 7/200 ml, or 13/500 ml in:

(a) Two consecutive samples;
(b) More than one standard sample when less than 20 are examined per month; or
(c) More than five percent of the standard samples when 20 or more are examined per month.

When coliform colonies in a single standard sample exceed the above values, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.

4. Physical Characteristics

4.1 Sampling—The frequency and manner of sampling shall be determined by the Reporting Agency and the Certifying Authority. Under normal circumstances samples should be collected one or more times per week from representative points in the distribution system and examined for turbidity, color, threshold odor, and taste.

4.2 Limits—Drinking water should contain no impurity which would cause offense to the sense of sight, taste, or smell. Under general use, the following limits should not be exceeded:

Turbidity	5 units
Color	15 units
Threshold Odor Number	3

5. Chemical Characteristics

5.1 Sampling

5.11 The frequency and manner of sampling shall be determined by the Reporting Agency and the Certifying Authority. Under normal circumstances, analyses for substances listed below need be made only semiannually. If, however, there is some presumption of unfitness because of the presence of undesirable elements, compounds, or materials, periodic determinations for the suspected toxicant or material, should be made more frequently and an exhaustive sanitary survey should be made to determine the source of the pollution. Where the concentration of a substance is not expected to increase in processing and distribution, available and acceptable source water analyses performed in accordance with standard methods may be used as evidence of compliance with these Standards.

5.12 Where experience, examination, and available evidence indicate that particular substances are consistently absent from a water supply or below levels of concern, semiannual examinations for those substances may be omitted when approved by the Reporting Agency and the Certifying Authority.

5.13 The burden of analysis may be reduced in many cases by using data from acceptable sources. Judgment concerning the quality of water supply and the need for performing specific local analyses may depend in part on information produced by such agencies as: (1) The U. S. Geological Survey, which determines chemical quality of surface and ground waters of the

United States and publishes these data in "Water Supply Papers" and other reports, and (2) The U. S. Public Health Service[2] which determines water quality related to pollution (or the absence of pollution) in the principal rivers of the Nation and publishes these data annually in "National Water Quality Network." Data on pollution of waters as measures by carbon chloroform extracts (CCE) may be found in the latter publication.

5.2 Limits—Drinking water shall not contain impurities in concentrations which may be hazardous to the health of the consumers. It should not be excessively corrosive to the water supply system. Substances used in its treatment shall not remain in the water in concentrations greater than required by good practice. Substances which may have deleterious physiological effect, or for which physiological effects are not known, shall not be introduced into the system in a manner which would permit them to reach the consumer.

5.21 The following chemical substances should not be present in a water supply in excess of the listed concentrations where, in the judgment of the Reporting Agency and the Certifying Authority, other more suitable supplies are or can be made available.

Substance	Concentration in mg/l
Arsenic (As)	0.01
Boron (B)	1.0
Chloride (Cl)	250.
Copper (Cu)	1.
Carbon Chloroform Extract (CCE)	0.2
Cyanide (CN)	0.01
Fluoride (F)	(See 5.23)
Iron (Fe)	0.3
Manganese (Mn)	0.05
Methylene Blue Active Substances	0.5
Nitrogen[1] (In Nitrate or Nitrite form)	10
Phenols	0.001
Sulfate (SO_4)	250.
Total Dissolved Solids	500.
Uranyl Ion (UO_2^{++})	5.0
Zinc (Zn)	5.0

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[1] In areas in which the nitrate content of water is known to be in excess of the listed concentration, the public should be warned of the potential dangers of using the water for infant feeding.

[2] Under the provisions of Reorganization Plan #2, 1966, this function is being continued by the Federal Water Pollution Control Administration of the Department of Interior.

Pesticides	mg/l*
1. Endrin	0.001
2. Aldrin	0.017
3. Dieldrin	0.017
4. Lindane	0.056
5. Toxaphene	0.005
6. Heptachlor	0.018
7. Heptachlor Epoxide	0.018
8. DDT	0.042
9. Chlorodane	0.003
10. Methoxychlor	0.035
11. Total organophosphorous and carbamate compounds (expressed in terms of parathion equivalent cholinesterase inhibitions)	0.1

12. 2,4,5-TP) have individual limits of 0.1.
13. 2,4,5-T) Sum of any combination of chlorinated
14. 2,4-D**) phenoxy alkyl pesticides = 0.1

5.22 The presence of the following substances in excess of the concentrations listed shall constitute grounds for rejection of the supply:

Substance	Concentration in mg/l
Arsenic (As)	0.05
Barium (Ba)	1.0
Cadmium (Cd)	0.01
Chromium (Hexavalent) (Cr^{+6})	0.05
Cyanide (CN)	0.2
Fluoride (F)	(See 5.23)
Lead (Pb)	0.05
Selenium (Se)	0.01
Silver (Ag)	0.05

5.23 Fluoride.—When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper limit in Table I. Presence of fluoride in average concentrations greater than two times the optimum values in Table I shall constitute grounds for rejection of the supply.

Where fluoridation (supplementation of fluoride in drinking water) is practiced, the average fluoride concentration shall be kept within the upper and lower control limits in Table I.

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* Long term exposure

**Short term period limit only - 2 to 3 days. No more than twice a year.

Table 1

Annual average of maximum daily air temperatures[1]	Recommended control limits— Fluoride concentrations in mg/1		
	Lower	Optimum	Upper
50.0-58.3 - - - - - - - - - - -	0.9	1.2	1.8
58.4-70.6 - - - - - - - - - - -	0.8	1.0	1.5
70.7-90.5 - - - - - - - - - - -	0.7	0.8	1.2

[1] Based on temperature data obtained for a minimum of five years.

In addition to the sampling required by paragraph 5.1 above, fluoridated and defluoridated supplies shall be sampled with sufficient frequency to determine that the desired fluoride concentration is maintained.

6. Radioactivity

6.1 Sampling

6.11 The frequency of sampling and analysis for radioactivity shall be determined by the Reporting Agency and the Certifying Authority after consideration of the likelihood of significant amounts being present. Where concentrations of Ra^{226} or Sr^{90} may vary considerably, quarterly samples composited over a period of three months are recommended. Samples for determination of gross activity should be taken and analyzed more frequently.

6.12 As indicated in paragraph 5.1, data from acceptable sources may be used to indicate compliance with these requirements.

6.2 Limits

6.21 The effects of human radiation exposure are viewed as harmful and any unnecessary exposure to ionizing radiation should be avoided. Approval of water supplies containing radioactive materials shall be based upon the judgment that the radioactivity intake from such water supplies when added to that from all other sources is not likely to result in an intake greater than the radiation protection guidance[2] recommended by the Federal Radiation Council and approved by the

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[2] The Federal Radiation Council, in its Memorandum for the President, September 13, 1961, recommended that "Routine control of useful applications of radiation and atomic energy should be such that expected average exposures of suitable samples of an exposed population group will not exceed the upper value of Range II (20 uuc/day of Radium-226 and 200 uuc/day of Strontium-90)."

President. Water supplies shall be approved without further consideration of other sources of radioactivity intake of Radium-226 and Strontium-90 when the water contains these substances in amounts not exceeding 3 and 10 uuc/liter, respectively. When these concentrations are exceeded, a water supply shall be approved by the Certifying Authority if surveillance of total intakes of radioactivity from all sources indicates that such intakes are within the limits recommended by the Federal Radiation Council for control action.

6.22 In the known absence[3] of Strontium-90 and alpha emitters, the water supply is acceptable when the gross beta concentrations do not exceed 1,000 uuc/liter. Gross beta concentrations in excess of 1,000 uuc/liter shall be grounds for rejection of supply except when more complete analysis indicates that concentrations of nuclides are not likely to cause exposures greater than the Radiation Protection Guides as approved by the President on recommendation of the Federal Radiation Council.

7. Recommended Analytical Methods

7.1 Analytical methods to determine compliance with the requirements of these Standards shall be those specified in Standard Methods for the Examination of Water and Wastewater, American Public Health Association, current edition and those specified as follows.

7.2 Barium—Methods for the Collection and Analysis of Water Samples, Water Supply Paper No. 1454, Rainwater, F. H. and Thatcher, L.L, U. S. Geological Survey, Washington, D. C.

7.3 Carbon Chloroform Extract (CCE)—Manual for Recovery and Identification of Organic Chemicals in Water, Middleton, F. M., Rosen, A.A, and Burttschell, R. H., Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio, Tentative Method for Carbon Chloroform Extract (CCE) in Water, J. Am. Water Works A., 54:223-227, Feb. 1962.

7.4 Radioactivity—Laboratory Manual of Methodology, Radionuclide Analysis of Environmental Samples, Technical Report R59-6, Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio; and Methods of Radiochemical Analysis Technical Report No. 173, Report of the Joint WHO-FAO Committee, 1959, World Health Organization.

7.5 Selenium—Suggested Modified Method for Colorimetric Determination of Selenium in Natural Water, Magin, G. B., Thatcher, L. L., Rettig, S., and Levine, H., J. Am. Water Works Assoc. 52,1199 (1960).

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[3] Absence is taken here to mean a negligibly small fraction of the above specific limits, where the limit for unidentified alpha emitters is taken as the listed limit for Radium-226.

7.6 Organisms of the coliform group—All of the details of techniques in the determination of bacteria of this group, including the selection and preparation of apparatus and media, the collection and handling of samples and the intervals and conditions of storage allowable between collection and examination of the water sample, shall be in accordance with Standard Methods for the Examination of Water and Wastewater, current edition, and the procedures shall be those specified therein for:

7.61 The Membrane Filter Technique, Standard Test, or
7.62 The Completed Test, or
7.63 The Confirmed Test, procedure with brilliant green lactose bile broth,[4] or
7.64 The Confirmed Test, procedure with Endo or eosin methylene blue agar plates.[4]

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[4] The Confirmed Test is allowed, provided the value of this test to determine the sanitary quality of the specific water supply being examined is established beyond reasonable doubt by comparison with Completed Tests performed on the same water supply.

MR. WALKER: Mr. Chairman, this completes our Federal presentation for the Conference.

MR. KLASHMAN: Fine. Our plans are as follows: We will call on New York and then the New England Interstate Water Pollution Control Commission and our plan was to go to lunch perhaps around 12:30.

Mr. Peloquin, how long is your statement?

MR. PELOQUIN: Not very long.

MR. KLASHMAN: Would it take ten minutes?

MR. PELOQUIN: Not that long. It wouldn't take any more than ten minutes.

MR. KLASHMAN: Then why don't we hear your statement and then we will adjourn for lunch. Is that all right with you, Mr. Haberer?

MR. HABERER: Yes.

MR. KLASHMAN: Then we will adjourn for lunch at about 12:30. I would like to indicate, for those of you who are staying at the Motel here, the desk clerk has indicated check out time has been extended to about 4 o'clock.

Go ahead, Mr. Peloquin.

STATEMENT OF ALFRED E. PELOQUIN, EXECUTIVE SECRETARY, NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION

MR. PELOQUIN: Mr. Chairman, and members of the Conference, at the fall meeting, held on September 24, 1968, the New England Interstate Water Pollution Control Commission directed me to represent the Commission as Conferee at this Enforcement Conference on the matter of pollution of Lake Champlain.

As you know, the New England Interstate Water Pollution Control Commission was initially established in 1947 as a congressionally authorized Compact organization, dedicated to the preservation and conservation of interstate waters of the six New England States and that portion of New York State, including the Lake Champlain Basin and the Housatonic River Basin.

The Commission is now in its 22nd year. The Commission's purpose, as defined by the Compact, is to establish reasonable physical, chemical and bacteriological standards of water quality for various classifications in use, and to review and approve the classification of interstate waters according to present and proposed highest use. In order to comply with the Compact, each of the signatory States has agreed to prepare a classification of its interstate waters and to submit this classification to the Commission for approval.

The classification proposed by a given State is not effective until reviewed and approved by the Commission. Each of the signatory States pledges, under the terms of the Compact, to provide for the abatement of existing pollution and for the control of future pollution of interstate, inland and tidal waters and to put and maintain the waters in a satisfactory condition consistent with the highest classified use of each interstate body of water.

The Commission has no authority to issue orders for pollution abatement. Such powers are retained by the individual States and used when needed to enforce classification requirements. Since its formation in 1947, the Commission has carried on a multipronged program relating to classification of interstate waters, assistance in planning for construction of municipal and industrial waste treatment facilities with a far-reaching research and publication program, training of waste treatment plant operators, legislation, and public information on education about the water pollution problems.

The Commission initially developed water use classifications and related standards of water quality in 1948. These have been revised five times in the past 21 years to reflect changes in conditions and advances in the state of the art. The present standards were revised and approved in April 1968, after consultation with officials of the Federal Water Pollution Control Administration, to assure that the standards, as adopted by the States under the terms of the Compact, would meet Federal requirements and would be recommended to the Secretary of the Interior for approval, in compliance with the Water Quality Act of 1965. Excuse me, did I say 1968? They were approved in April 1967 and adopted by the member States.

In April 1968, the States of New York and Vermont submitted to the Commission, for approval, their respective classifications for Lake Champlain. Upon recommendation of the Commission's Technical Advisory Board, approval action was deferred pending further discussion of classification of lower Lake Champlain, for which Vermont proposed a "B" classification and New York proposed a "C". Since the water uses for a given classification designation adopted by each State seemed to differ, the Technical Advisory Board also recommended a review of the uses assigned to the lake waters. The one adopted was the New England Interstate Water Use Classification standards of water quality, as revised in April 1967. Under these standards Class "B" water is, and I quote: "suitable for bathing, other recreational purposes, agricultural uses, industrial processes, and cooling, excellent fish and wildlife habitat, good aesthetic value, acceptable for public water supply with appropriate treatment." Under the New York standards, the best usage of Class "AA" and Class"A" water is: "source of water supply for drinking, culinary or food purposes, and many other uses." Though the letter designation may differ, the assigned water uses are essentially the same. A comparison of the standards of water quality for the New York Class"AA", Class"A" and the New England Interstate Class "B" shows that the Interstate standards are more restricted and in the area of dissolved oxygen for trout waters in New York State require not less than 5 parts per million dissolved oxygen; for non-trout water not less than 4.0. As was stated earlier, the New England Interstate standards require 75 percent saturation 16 hours per day with 5.0 mg/l at any time.

MR. KLASHMAN: Mr. Peloquin, are you going to submit a prepared statement?

MR. PELOQUIN: Yes, I will.

On sludge deposits, solid refuse, floating solids, oils, scums, grease, under the Interstate Class"B" none is allowable. Under the New York Class "AA" none which is attributable to a waste discharge, and under the Class "A" the allowance is along the lines of the New England Interstate classification on sludge deposits, floating solids, oils, grease and scums shall not be allowed expect for such small amounts as may result from the discharge of appropriately treated sewage or industrial waste effluent. The coliform criteria for Class "AA" in New York is 50 per 100 ml. and for Class "A" water the limit is 5000 per 100 ml. The New England Interstate classification requires 1000 per 100 ml., so that this is somewhat more restricted for the Class "A" but less restricted for Class "AA". On base diluter we require none such concentration that would impair any uses specifically assigned to this Class that would cause bad taste and odor in edible fish. This is the Interstate classification. New York allows essentially the same, but does provide for a threshold odor of 8.0 after appropriate dilution of waste. The chemical constitutent allowances are essentially the same or very similar to those carried by the New England Interstate standards under the notes to the classification itself. As we can see then, the New York classifications for the New York standards for the Class "AA" and Class "A" waters are somewhat less restricted than classifications established for Class "B" water under the Interstate system.

As I stated earlier, in reply to a question, as in the past where such differences in standards occurred, New York has always agreed to maintain the interstate waters involved in accordance with the New England Water Pollution Control Commission interstate standards.

On October 9, 1968, New York held a hearing to consider reclassification of lower Lake Champlain from "B" to "C". All the testimony presented at the hearing supported the upgrading in the reclassification. Upon final action, reclassification of Lake Champlain will again be submitted to the Commission for review and reconsideration. At the request of the Commissioners of the New England Interstate Water Pollution Control Commission and the Federal Water Pollution Control Administration, the Technical Advisory Board - the Commission's Technical Advisory Board - is reviewing the current interstate standards as pertain to dissolved oxygen, temperature and coliform bacteria criteria. Until the Technical Advisory Board study is completed, we cannot agree with the Federal recommendations for temperature and bacteria as contained in the Conference report.

Under consideration, I might state, is the range of temperature increases based upon a maximum surface water temperature, in accordance with the following: At temperatures above 70° no increase in temperature allowed; from 67°-70° a 1° temperature increase is allowed; from 63°-58° 2° allowed; from 59°-62° a 3° increase allowed; from 55°-58° 4° allowed; from 51°-54° 5° increase allowed; from 47°-50° 6° allowed; from 43°-46° 7° allowed; from 39°-42° 8° allowed; from 36°-38° 9° and 35° Fahrenheit and below a maximum allowable increase of 10°. You have a range then of 35° or below temperature, an allowable increase of 10° Fahrenheit to 0° allowable increase when the temperature reaches 70° We also question the desirability of a vertical mixing zone. We are not opposed to common standards of temperature indicated for coliform organisms, but we feel that additional study by our Technical Advisory Board is essential before submitting a common standard to the Commission for approval.

I think of greater importance at this Conference is the accumulation of deposits in lower Lake Champlain in the vicinity of Ticonderoga Creek and the impact of these deposits on the classification of the lake. The bottom deposits may defy the best efforts to meet the established water quality standards. It is my hope that out of the Conference will come recommendations for coping with the existing bottom deposits and that some methodology may be developed for neutralizing, removing or otherwise negating the effect of the deposits. It is also my hope that in the very near future the discharge of waste containing solid materials, particularly from sources both in New York and Vermont, will be eliminated to preclude the further development or the addition of additional solids to an already critical situation in the lower portion of the lake.

This concludes my statement, Mr. Chairman.

MR. KLASHMAN: Thank you very much, Mr. Peloquin. Do you have any questions of Mr. Peloquin, Mr.

Haberer? Mr. Thieme. Mr. Walker.

(No response.)

If not, I would like to recess the meeting for lunch. It is now 12:30. We will reconvene at 1:45. That is an hour and fifteen minutes.

(Whereupon, at 12:30 P.M., a luncheon recess was taken.)

AFTERNOON SESSION.

(1:45 P.M.)

MR. KLASHMAN: Gentlemen, may we come to order? Intermission is now over and we will reconvene this Conference.

Mr. Haberer, will you please present the New York position?

MR. HABERER: Mr. Chairman, and members of the Conference, I am pleased to be here today on this foreign show. We are looking forward to the results of this Conference because we hope it will bring the various agencies represented here today into better agreement than we had in the past, but we think we have been pretty close in agreement and we are looking forward to the results of this Conference.

Now, I wish to call on Mr. Donald Stevens to give a summary of our presentation. You have all had copies of it and there are more in the back of the room if you do not have them. Mr. Stevens, who is our Director of Bureau of Water Quality Management, will present a summary of our statement. I wish to have put in the record our request to have the full report copied into the record.

MR. KLASHMAN: It shall be so done, as requested.

STATEMENT OF DONALD D. STEVENS, DIRECTOR, BUREAU OF WATER QUALITY MANAGEMENT, NEW YORK

MR. STEVENS: Mr. Klashman, Conferees, ladies and gentlemen:

D. Stevens

As Mr. Haberer has indicated my name is Donald Stevens and I am Director of the Bureau of Water Quality Management in the Division of Pure Waters, New York State Health Department. The New York State Health Department has prepared a report. Copies are available and have been rather generally distributed. I would like at this time to read the Activity Summary which starts on Page 2 of this report.

Since the start of the Pure Waters Program in May 1965, the State has initiated the following activity in the Lake Champlain Drainage Basin:

1. Submitted Water Quality Standards. New York State has prepared and submitted water quality standards and reports for the entire State, including the Lake Champlain Drainage Basin as required by the 1965 Water Pollution Control Act. These standards have been approved by the Secretary of the Interior. Very recently, in fact, on October 9, 1968, in the Village of Ticonderoga, the State of New York held a reclassification hearing to update the standards of lower Lake Champlain so that they would be comparable to those of Vermont. The Water Resources Commission has not yet adopted the recommendations, but based on these hearings, it is anticipated to do so in the near future.
2. Water Quality Surveillance. Manual water quality monitors have been installed at five sampling stations in the Lake Champlain Drainage Basin.
3. Accelerated Utility Planning by:

D. Stevens

a. having seven sewage utility studies completed or under way for the area, and

b. having three public water supply studies completed or under way for the area, and

c. completed under the auspices of the State Conservation Department, a multi-purpose water resources survey for the entire State, including the Lake Champlain Drainage Basin.

The State investment for water supply and sewage studies in the Lake Champlain Drainage Basin is about $400,000.

4. Implemented the Sewage Operation and Maintenance Grant Program. This program has spurred improved treatment plant operation, which results in water quality improvement. Since May of 1965, a total of $105,093 in State grants have been awarded in the Lake Champlain Drainage Basin to aid municipalities in the treatment, operation and maintenance of waste treatment facilities.

5. Enforcement. Issued 12 Court Orders in the Lake Champlain Drainage Basin for the abatement of pollution. Presently there are 20 municipalities and industries which are discharging raw or inadequately treated sewage and industrial waste into Lake Champlain Drainage Basin. All major polluters are under order from the New York State Commissioner of Health to abate pollution by 1972; the remainder are under Department directive.

6. Plan Review. Issued 71 construction permits to municipalities and/or industries operating new or expanded collection or treatment facilities. These approved facilities have a construction cost total of $4,763,300.

D. Stevens

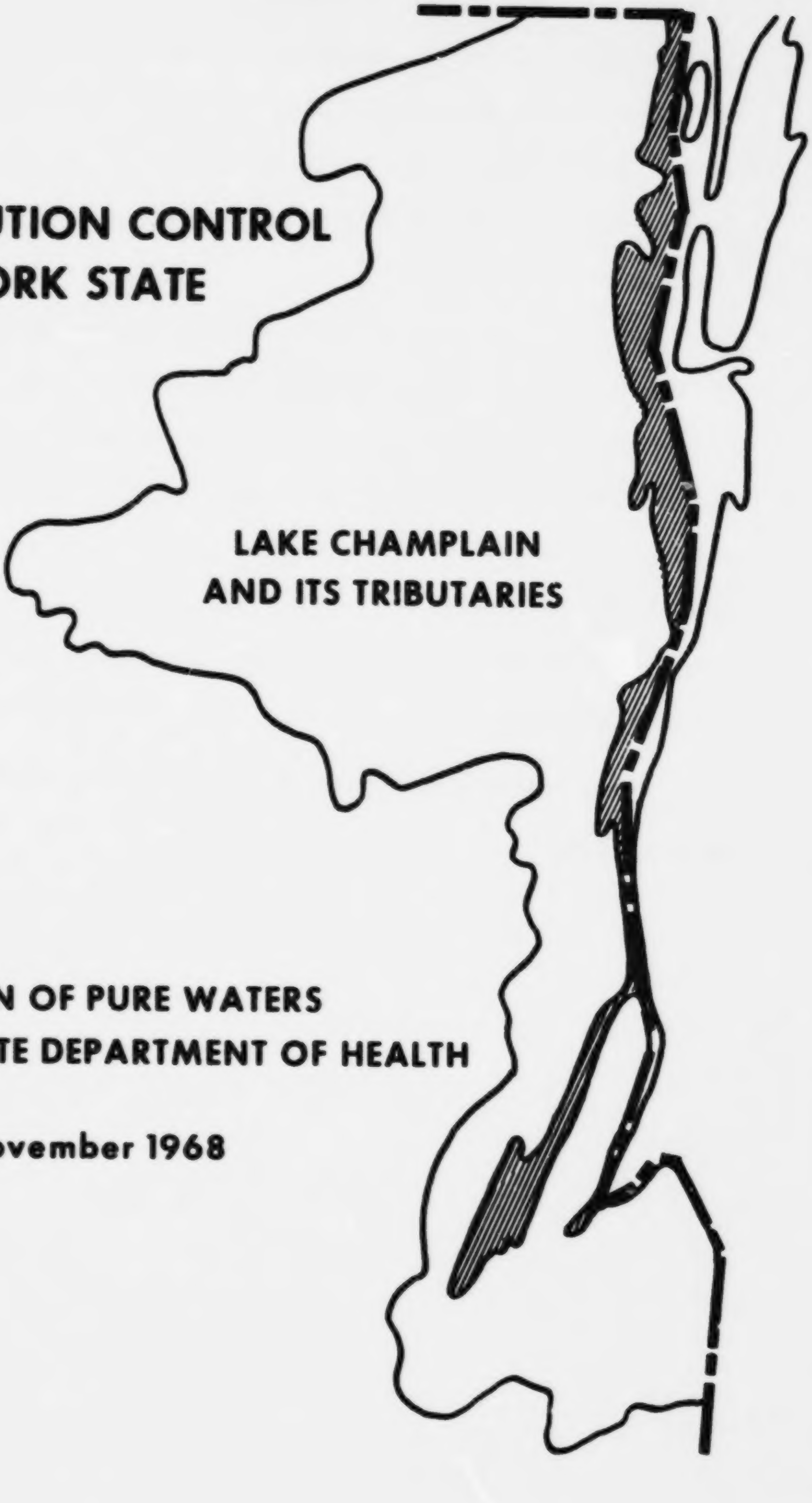
7. *Construction Grants*. Executed nine construction grant contracts with municipalities to construct waste treatment facilities. Applications approved included total State grants estimated at $8,677,314 and $659,650 in Federal grants.

8. *Reorganization*. Organized a Division of Pure Waters within the New York State Health Department; the Division of Pure Waters consist of sanitary and construction engineers, scientists, administrators, engineering technicians and supporting clerical services. The Department's Regional Office which serves the Lake Champlain Drainage Basin was strengthened by filling several engineering positions.

Thank you.

(The above-mentioned Report for the State of New York follows.)

WATER POLLUTION CONTROL
NEW YORK STATE



LAKE CHAMPLAIN
AND ITS TRIBUTARIES

DIVISION OF PURE WATERS
NEW YORK STATE DEPARTMENT OF HEALTH

November 1968

WATER POLLUTION CONTROL
NEW YORK STATE

LAKE CHAMPLAIN
AND ITS TRIBUTARIES

Prepared by: Albany Regional Office
Reviewed by: Division of Pure Waters
New York State Department
of Health
November, 1968

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PREFACE

On the basis of a written request from Commissioner W. Thieme, of the Vermont Water Resources, the Department of the Interior has called a conference in the matter of pollution of interstate waters of Lake Champlain and its tributary basin, on November 13, in Burlington, Vermont. This report reviews New York State's Water Pollution Control activities in the three year period from May, 1965 to date.

Many developments in the administrative, legislative, and financial portions of the State's Water Pollution Control Program have now become more than realities. Key changes include voter approval on November, 1965, of the $1 billion construction grant program, implementation of a strengthened enforcement program, organization of the Division of Pure Waters of the State Health Department, passage of an outlet registration law, expanded pollution control legislation, and the orgainzation of the State's Pure Waters Authority.

Accelerated water pollution control activity in the implementation of new programs during the past three years have served further to establish State's leadership in the Federal - State - local effort required to abate water pollution.

This report to the conferees briefly reviews New York State Water Pollution Control activities since the conception of its Pure Waters Program in the Lake Champlain Drainage Basin.

Albany, New York
November 13, 1968

ACTIVITY SUMMARY

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1. Submitted Water Quality Standards. New York State has prepared and submitted water quality standards and reports for the entire state, including the Lake Champlain Drainage Basin as required by the 1965 Water Pollution Control Act. These standards have been approved by the Secretary of the Interior. Very recently, in fact, on October 9, 1968, in the Village of Ticonderoga, the State of New York held a reclassification hearing to update the standards of lower Lake Champlain so that they would be comparable to those of Vermont. The Water Resources Commission has not yet adopted the recommendations, but based on these hearings, it is anticipated to do so in the near future.

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ACTIVITY SUMMARY (cont'd)

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I

OFFICIAL CLASSIFICATIONS

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Pursuant to the State Water Pollution Control Act, § 1205, paragraph 2, the Water Resources Commission has adopted and assigned classifications and standards of quality and purity to all surface waters of the Lake Champlain Drainage Basin except waters within the State-owned Forest Preserve Lands. Copies of the conformed documents containing the Official Classifications are included.

Waters contained within the boundaries of the State-owned Forest Preserve Lands are controlled under the provisions of the State Constitution and the Conservation Law and are excluded from classification. All waters within one hundred feet (100 ft.) of the State-owned Forest Preserve Lands are assigned to Class A with standards of quality and purity for Class A.

A reclassification hearing was held on March 2, 1966, regarding a stretch of the West Branch of the Ausable River, a tributary of Lake Champlain. This stretch was upgraded from Class "F" to Class "C" in accordance with the Adopting Order dated October 4, 1966.

A conference was held with representatives of the Vermont Department of Water Resources on April 21, 1967, regarding classifications of lower Lake Champlain, Poultney River, and Mettawee River.

A reclassification hearing was also held on October 9, 1968 regarding lower Lake Champlain. New York State has classified lower Lake Champlain as Class "C" and Vermont assigned New England Interstate Water Pollution Control Commission Class "B". New York State's requirement of secondary treatment and effluent disinfection will protect the water uses outlined for Vermont's Class "B" waters. How-

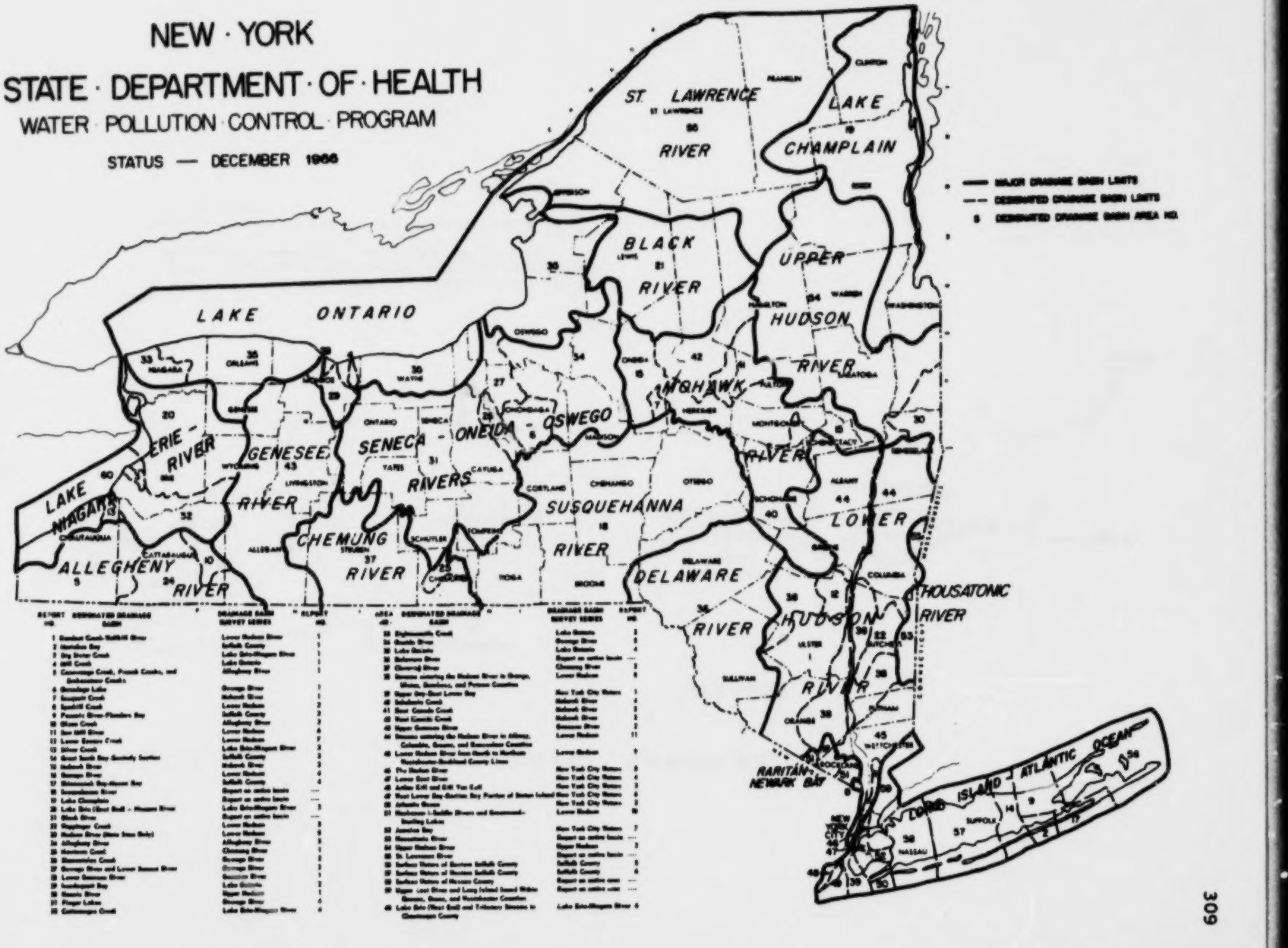
OFFICIAL CLASSIFICATIONS (cont'd)

ever, as a result of the reclassification hearing it is anticipated that the Water Resources Commission will approve an upgrading from Class "C" to Class "B" to implement a water management program consistent with that of the State of Vermont.

Interstate waters, to which the water quality standards provisions apply under Section 10(c) (1) of the Federal Water pollution Control Act, are described and listed in the following table, "Interstate Waters Within New York State, Lake Champlain Drainage Basin."

NEW · YORK
STATE · DEPARTMENT · OF · HEALTH
WATER · POLLUTION · CONTROL · PROGRAM

STATUS — DECEMBER 1966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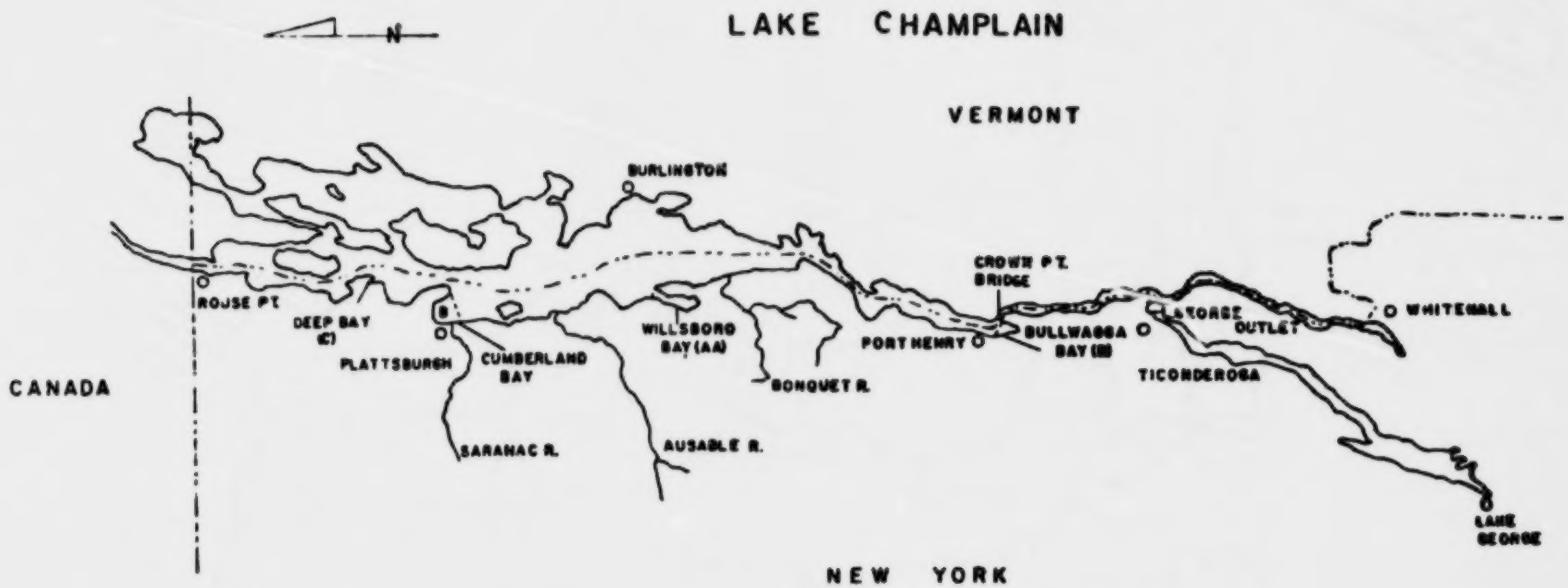
LAKE CHAMPLAIN
BLACK RIVER
UPPER HUDSON RIVER
MOHAWK RIVER
OSWEGO
SENECA - ONEIDA RIVERS
GENESEE RIVER
ERIE - RIVER
LAKE NIAGARA
ALLEGHENY RIVER
CHEMUNG RIVER
SUSQUEHANNA RIVER
DELAWARE RIVER
LOWER HUDSON RIVER
HOUSATONIC RIVER
RARITAN - NEWARK BAY
LONG ISLAND
ATLANTIC OCEAN
NEW YORK CITY


N
LAKE CHAMPLAIN
VERMONT
BURLINGTON
CROWN PT. BRIDGE
WHITEHALL
ROUSE PT.
DEEP BAY (C)
PLATTSBURGH
B
CUMBERLAND BAY
WILLSBORO BAY (AA)
BONQUET R.
PORT HENRY
BULLWAGGA BAY (B)
LA GORGE
OUTLET
TICONDEROGA
CANADA
SARANAC R.
AUSABLE R.
LAKE GEORGE
NEW YORK

NOTE

1) FROM NEW YORK SHORELINE TO 1/4 MILE FROM SHORELINE TO DEPTH OF 30' AND BEYOND, EXCEPT FOR BAYS NOTED (DEEP, WILLSBORO, CUMBERLAND AND BULLWAGGA) - CLASS "A"

2) OPEN REACHES, EXCLUDING SHORELINE WATERS AND BAYS NOTED - CLASS "AA"

INTERSTATE WATERS WITHIN NEW YORK STATE
ST. LAWRENCE RIVER BASIN
OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	*Map Ref. No.	Primary Present & Future Uses	Class	Standards
1	C, portion as described	Lake Champlain	Located between the States of New York and Vermont. All shoreside waters extending outward from the mainland at least one-quarter mile from the shoreline to a depth of thirty feet and beyond where necessary in the section beginning at the New York - Quebec (United States-Canada) boundary and extending along the westerly shoreline to the Lake Champlain Toll Bridge at Crown Point, with the exception of the following waters; Deep Bay, Cumberland Bay, the shoreside waters from Cumberland Bay southward to Ausable Point, Willsboro Bay, North West Bay and Bullwagga Bay.	A-26 B-26 C-26 D-26	Domestic water consumption, recreation, fishing, agriculture, navigation, waste disposal	A	A
2	C, portion as described	Lake Champlain	Deep Bay, which is located to the northeast of Treadwell Bay and 5.3 miles east of the hamlet of Beekmantown.	A-26	Fishing, recreation, agriculture	C	C

(Cont.)

*Official classifications (Appendix 21B)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	me	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
3	C, portion as described	ke Champlain	Portion of Cumberland Bay, which is located east of the City of Plattsburgh and on the westerly side of Lake Champlain. Included is that portion lying westerly of the line beginning at a landpoint to be found on the westerly shore of the peninsula called Cumberland Head 0.75 mile south, southeasterly of the northmost part of Cumberland Bay proper and extending from this point in a southwesterly direction to the shore end of the City of Plattsburgh.	B-26	Recreation, fishing, navigation, waste disposal	B	B
4	C, portion as described	ke Champlain	That portion of Cumberland Bay lying easterly and southerly of the line from the south line of the City of Plattsburgh and extending to Cumberland Head as described in the preceding item and westerly of the line beginning at Cumberland Head Lighthouse and extending southwesterly to the northmost point of Crab Island, thence running northwesterly to the shore at the south line of the City of Plattsburgh.	B-26	Domestic water consumption, recreation, fishing, navigation	A	A

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
5	C, portion as described	Lake Champlain	That portion of the lake enclosed by the lines described as follows: from the shore at the south line of the City of Plattsburgh to the northmost point of Crab Island; from the southmost point of Crab Island to the northmost point of Valcour Island; from the southmost point of Valcour Island to Ausable Point. Included are the areas around Crab Island and Valcour Island extending outward at least one-quarter mile from the shoreline and beyond where necessary to a depth of thirty feet.	B-26	Domestic water consumption, recreation, fishing, agriculture	A	A
6	C, portion as described	Lake Champlain	Willsboro Bay, located north of the hamlet of Willsboro. Included is all that section inclosed by a line from the northmost point of Willsboro Point westerly to the mouth of Trib. 40 which enters Lake Champlain from the west 2.7 miles southeasterly of Port Douglas.	C-26	Domestic water consumption, recreation, fishing, agriculture	AA	AA

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
7	C, portion as described	Lake Champlain	North West Bay, which is located on the westerly side of Lake Champlain and east of the Village of Westport. Included are the waters lying westerly and north of the line beginning at the point of the headland between Partridge Harbor and Hunter Bay and running southerly to an intersection with the New York-Vermont State Line and a line directly east from the shoreline at Bluff Point.	D-26	Domestic water consumption, recreation, fishing, agriculture, waste disposal	A	A
8	C, portion as described	Lake Champlain	Bullwagga Bay, which is located to the south and slightly east of the Village of Port Henry	D-26	Recreation, fishing, agriculture	B	B
9	C, portion as described	Lake Champlain	Open reaches of the lake within New York State in the section beginning at the New York-Quebec (United States-Canada) border and extending southerly to the Lake Champlain Toll Bridge at Crown Point. Excluded are the sections described previously as "shoreside waters", Deep Bay, Cumberland Bay, the shoreside waters from Cumberland Bay to Ausable Point, Willsboro Bay; North West Bay, and Bullwagga Bay.	A-26 B-26 C-26 D-26	Domestic water consumption, recreation, fishing, navigation	AA	AA

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
10	C, portion as described	Lake Champlain	That portion of Lake Champlain within New York State lying south of the Lake Champlain Toll Bridge at Crown Point and including South Bay.	D-26 E-26 F-26	Fishing, recreation, agriculture, navigation, waste disposal	C	C
462	C-134 portion as described	Mettawee River and Barge Canal	Enters Lake Champlain from the southeast at the south shore of East Bay and 0.8 mile north of the Village of Whitehall. Mouth to a point 2.1 miles upstream from the mouth and at the confluence of the Barge Canal with the Mettawee River and 0.8 mile south of the south line of the Village of Whitehall.	F-26	Fishing, recreation, agriculture, navigation, waste disposal	C	C
463	C-134 portion as described	Mettawee River	From the confluence with the Barge Canal upstream to Trib 15. Trib. 15 enters from the southeast 0.2 mile east of the intersection of the Fort Ann-Granville-Whitehall township lines and 2.2 miles north of the hamlet of West Granville.	F-26 G-26	Fishing, recreation, agriculture	C	C
464	C-134 portion as described	Mettawee River	From Trib. 15 to the New York-Vermont Boundary line at the east boundary of the Village of Granville.	G-26	Fishing, recreation, agriculture, waste disposal	C	C(T)

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
469	C-134-4 portion as described	Wood Creek and Barge Canal	Enters Mettawee River from the south 0.3 mile upstream from Trib. 3 and approximately 0.9 mile south of the Village of Whitehall. Mouth to Lock 9 of the Barge Canal located 0.3 mile upstream from the bridge crossing at the hamlet of Smiths Basin.	F-26 G-26	Fishing, recreation, agriculture, navigation, waste disposal	C	C
470	C-134-4 portion as described	Wood Creek	From Lock 9 of the Barge Canal to source	G-26 G-25	Fishing, recreation, agriculture	C	C
471	C-134-4 Barge Canal, portion as described	Barge Canal	From Lock 9 of the Barge Canal to the Lake Champlain Drainage Basin limit which is 1.7 miles northeast of the hamlet of Dunham Basin.	G-26 G-25	Fishing, recreation, agriculture	C	C
532	C-138 portion as described	Poultney River	Enters Lake Champlain from the northmost part of East Bay 2.8 miles north of the peak of Warner Hill and 3.2 miles northwest of the peak of Hampton Hill. Mouth to Carver Falls which are located 3.8 miles upstream from the mouth and 2.2 miles north of the peak of Hampton Hill. Included are the portions of the waters within New York State.	F-26	Fishing, recreation, agriculture	C	C

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
533	C-138 portion as described	Poultney River	From Carver Falls upstream to the point where the river leaves New York State 2.6 miles east of the peak of Thorn Hill and 0.9 mile south of the hamlet of Hampton. Included are the portions of the waters within New York State.	F-26	Fishing, recreation	C	C(T)

(Cont.)

INTERSTATE WATERS

OFFICIAL CLASSIFICATIONS - LAKE CHAMPLAIN DRAINAGE SUB-BASIN - SMALL STREAMS

Item No.	Waters Index No.	Name	Comments	Map Ref. No.	Primary Present & Future Uses	Class	Standards
528	C-134-21 and tribs.	Tributary of . Mettawee River & subtrib.	Enter Mettawee River from the north and east 2.0 and 2.3 miles upstream from Trib. 19, respectively, and 0.8 mile west and 0.6 mile southwest of Raceville. Included are portions within New York State.	G-26	Agriculture, drainage	D	D
530	C-134-23 and trib.	Tributary of Mettawee River	Enters Mettawee River from northeast 0.4 mile upstream from Indian River and in the northwest part of the Village of Granville. Included are portions within New York State.	G-26	Agriculture, drainage	D	D
231	C-25	Ausable River	Enters Lake Champlain from the west via an upper and a lower mouth which are 0.6 and 1.3 miles south of Ausable Point, respectively, and 5.2 and 4.5 miles northeast of Keeseville.	B-26, C-26, C-25		C	C
254	C-25-26 portion as described	West Branch Ausable River	Enters Ausable River from the west at Ausable Forks. Mouth to Rogers mill dam which is located 1.4 miles upstream from the mouth and 2.2 miles northeast of the peak of Clark Mountain.	C-25		C	C
255	C-25-26 portion as described	West Branch Ausable River	From the Rogers mill dam upstream to the dam at the hamlet of Wilmington which is located 3.1 miles westerly of the peak of Hamlin Mountain.	C-25, C-24		C	C(T)
428	C-101	Lake George Outlet	Enters Lake Champlain from the northwest 1.0 mile southeast of the northeast corner of the Village of Ticonderoga.	E-26		D	D

II

WATER QUALITY SURVEILLANCE NETWORK

WATER QUALITY SURVEILLANCE NETWORK

The Water Quality Surveillance Network established by the New York State Health Department is an essential ingredient to water quality control. The system was placed in operation late in 1964 and now contains 100 state-wide manually operated surface water stations. At 12 of these manually operated sampling stations, automatic water quality monitoring systems will be established by the end of this year.

Within the Lake Champlain Drainage Basin, there are now five surface stations providing at various time intervals extensive water quality data. The following table indicates the location of these stations, frequency of sampling and special analyses done at these stations. In addition to the special parameters measured, a list of tests run at each one of these sampling stations is also given.

LAKE CHAMPLAIN DRAINAGE BASIN

Water Sampling Stations

Station Number	Name	Frequency of Sampling	Special Exams.
10-0002	Lake Champlain @ Rouses Point	Semi-Annual	Rad. Microscopic Flow
10-0010	Saranac River @ Plattsburg	Quarterly	Flow
10-0015	Ausable River @ Keesville	Quarterly	Flow
10-0050	Ticonderoga Creek @ Ticonderoga	Monthly	Flow
10-0201	Lake George @ the Narrows	Semi-Annual	Microscopic Flow

WATER QUALITY SURVEILLANCE NETWORK

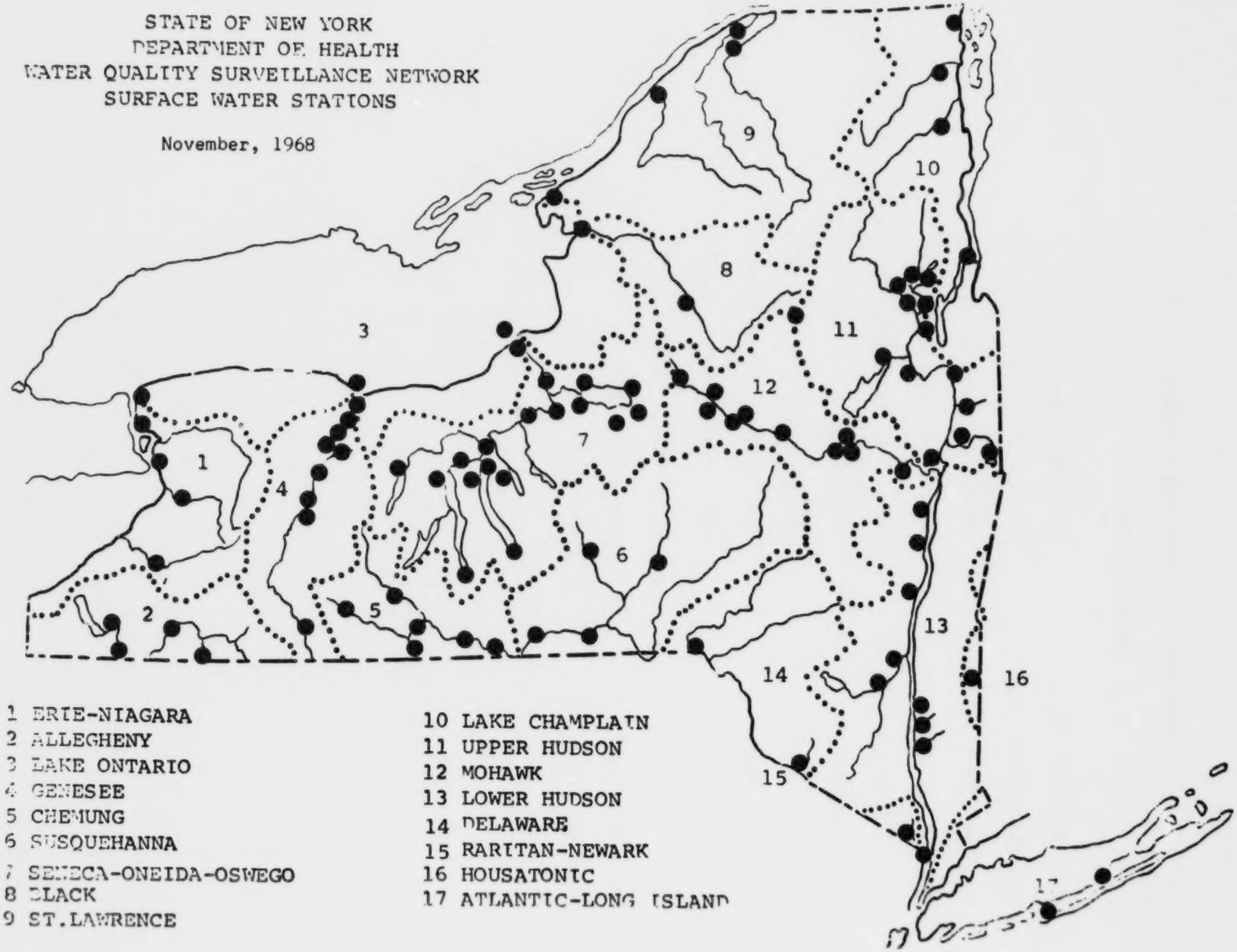
Parameters Measured

Ammonia (as N) (mg/l)
Org. Nit. (as N) (mg/l)
Nitrites (as N) (mg/l)
Nitrates (as N) (mg/l)
C.O.D. (dichr) (mg/l)
Phosphates (mg/l)
Sulfates (mg/l)
Sodium (mg/l)
Potassium (mg/l)
Iron (mg/l)
Manganese (mg/l)
Total ABS (mg/l)

Chlorides (mg/l)
Conductivity (mg/l)
Hardness (as $CaCO_3$) (mg/l)
Hydro. Alk. (as $CaCO_3$) (mg/l)
Carb. Alk. (as $CaCO_3$) (mg/l)
Bicarb. Alk. (as $CaCO_3$) (mg/l)
Res. on Evap. (total) (mg/l)
Res. on Evap. (fixed) (mg/l)
Susp. Solids (total) (mg/l)
Susp. Solids (fixed) (mg/l)
Magnesium (mg/l)

STATE OF NEW YORK
DEPARTMENT OF HEALTH
WATER QUALITY SURVEILLANCE NETWORK
SURFACE WATER STATIONS

November, 1968



1 ERIE-NIAGARA
2 ALLEGHENY
3 LAKE ONTARIO
4 GENESEE
5 CHEMUNG
6 SUSQUEHANNA
7 SENECA-ONEIDA-OSWEGO
8 BLACK
9 ST.LAWRENCE
10 LAKE CHAMPLAIN
11 UPPER HUDSON
12 MOHAWK
13 LOWER HUDSON
14 DELAWARE
15 RARITAN-NEWARK
16 HOUSATONIC
17 ATLANTIC-LONG ISLAND

III

WASTE WATER UTILITIES PLANNING

WASTE WATER UTILITIES PLANNING

The State Water Pollution Control Act provides 100 percent grants for comprehensive studies and reports for the master planning of service areas for water and waste water utilities. A definition of "Comprehensive Study and Report," is included along with a summary sheet relating to studies being implemented and a table listing all comprehensive sewerage and water studies completed or in progress in the Lake Champlain Drainage Basin.

While comprehensive studies do not provide detailed information for minor sewage disposal systems and water extensions, the studies do provide a plan for multimunicipal action and for the orderly development of needed sewerage utilities at small communities and new land subdivisions for residential, commercial and industrial developments.

STUDIES UNDER IMPLEMENTATION

WPC-CS-107 - PLATTSBURGH AND ENVIRONS - CLINTON COUNTY

The study area includes the City of Plattsburgh, the Town of Peru, the Town of Plattsburgh and the Town of Schuyler Falls.

The recommended plan provides for three sewage treatment plants having sufficient capacity for 50,501 persons.

The total first-stage project costs are estimated to be $9,736,000 (1970-Est.).

WPC-CS-45 - TOWN AND VILLAGE OF TICONDEROGA - ESSEX COUNTY

The study area includes the Village and Town of Ticonderoga.

The recommended plan provides for a sewage treatment plant having sufficient capacity to serve 6,800 persons.

The total first-stage project costs are estimated to be $1,825,000 (1967- Est.).

WPC-CS-46 - LAKE GEORGE AREA - WARREN COUNTY

The study area includes the Village of Lake George and portions of the Town of Lake George and the Town of Bolton.

The recommended plan provides for four sewage treatment plants having sufficient capacity for 52,000 persons.

The total first-stage project costs are estimated to be $7,856,000 (1965-Est.).

COMPREHENSIVE PUBLIC SEWERAGE STUDIES
COMPLETED OR IN PROGRESS

Lake Champlain Drainage Basin

Contract No.	County	Area	Consultant	Cost	Comment
168	Clinton	entire county	Teetor-Dobbins and Staunton-Freeman	$56,000	study under technical review by N.Y.S.H.D.
107	Clinton	Platts-burgh (C) and Environs	Ronald Laberge	$6,500	study accepted by N.Y.S.H.D. on 6/12/67
16	Clinton	Chazey (T) & (V)	O'Brien and Gere	$9,200	study accepted by N.Y.S. H.D. on 5/12/64
160	Essex	entire county	Rist-Frost	not available	contract being negotiated
45	Essex	Ticonderoga (T) & (V)	Joseph Kestner	$22,760	study accepted by N.Y.S. H.D. on 9/5/67
188	Warren	entire county	Rist-Frost	not available	application approved on 7/24/67 by N.Y.S.H.D.
46	Warren	Bolten (T)	Metcalf & Eddy	$31,070	study accepted by N.Y.S. H.D. on 2/18/66
			Total Estimate	$250,000	

COMPREHENSIVE PUBLIC WATER STUDIES
COMPLETED OR IN PROGRESS

Lake Champlain Drainage Basin

Contract No.	County	Area	Consultant	Cost	Comments
53	Clinton	entire county	Teetor-Dobbins	$68,000	under review by N.Y.S.H.D.
50	Essex	entire county	Rist-Frost	not available	application approved by N.Y.S.H.D. on 1/5/67
64	Warren	entire county	Rist-Frost	$40,000	application approved by N.Y.S.H.D. on 12/11/67

Total Estimate = $150,000

ENVIRONMENTAL HEALTH SERVICES

HOLLIS S. INGRAHAM, M.D.
COMMISSIONER

STATE OF NEW YORK
DEPARTMENT OF HEALTH

84 HOLLAND AVENUE
ALBANY, NEW YORK 12208

DWIGHT F. METZLER, P.E.
DEPUTY COMMISSIONER

DIVISION OF PURE WATERS
ROBERT D. HENNIGAN, P.E.
ASSISTANT COMMISSIONER

May 1, 1967

TO: Engineering Firms Practicing in New York State

SUBJECT: Pollution Abatement Action and Comprehensive Sewerage Studies (Technical Bulletin No. 27)

Comprehensive sewerage studies, which are 100% State-financed and administered by the Comprehensive Utilities Planning Section, are intended to be utilized for long-range utility planning.

A comprehensive study schedules projects for immediate, intermediate and long-range construction according to anticipated growth and need.

Such projects are developed with regard to master-planning concepts, but generally not in sufficient engineering detail to go directly into construction.

A project report is required (See Technical Bulletins 2 and 2.1, July 15 and July 20, 1966). This is a pre-requisite for preparing construction plans and specifications for a particular localized improvement. This report examines the technical cost and organizational aspects of a proposed project in much greater detail than is included in a comprehensive study.

In brief, comprehensive sewerage studies are long-range utility master planning; project reports are concerned with the immediate implementation of a particular improvement. Particular projects should be closely coordinated with comprehensive studies. These considerations with regard to project implementation and comprehensive sewerage utility master planning should be taken into consideration:

1. Comprehensive master-plan sewerage utility studies ideally should have been completed well in advance of project implementation activities. This is not always possible.

2. Comprehensive studies must, therefore, be developed simultaneously with engineering project reports or final construction plans. The Program must go ahead; it cannot wait for completion of master plans.

3. Comprehensive studies are now proceeding on a county-wide basis. They will be superimposed on and "envelop" engineering project reports and final construction plans already underway.

4. Pollution abatement must continue, and even be stepped up, notwithstanding the need to develop comprehensive studies, project reports and project construction plans simultaneously.

5. Some methods of handling these problems:

   (a) Comprehensive studies must embrace, reflect and professionally evaluate studies, reports and construction plans completed or in process.

   (b) Lack or incompletion of comprehensive studies must not be permitted to deter, delay or impede urgently needed "particular" pollution-abatement projects.

   (c) Municipalities must finance, with local monies, development of the engineering project report, as well as preparation of construction plans. (HUD planning advances cannot now be expected.)

   (d) Interim reports may be needed from engineering firms making comprehensive studies. These interim reports should be directed to resolving critical questions arising out of the immediate implementation of an urgently needed project.

   (e) Engineering firms are expected to cooperate closely and freely to assure consistency and compatibility of findings and evaluations for master-plan studies and project reports and/or construction plans for specific projects.

(f) When conflicts appear to be developing, a meeting, including engineering firms, clients and other affected parties should be arranged with the Comprehensive Utilities Planning Section in Albany to resolve differences, and to determine upon a coordinated course of action reflecting Program objectives and needs.

Robert D. Hennigan

Robert D. Hennigan

IV

OPERATION AND MAINTENANCE GRANT PROGRAM

OPERATION AND MAINTENANCE GRANT PROGRAM

The Operation and Maintenance Grant Program of New York State was initiated in 1965. This program was developed to aid municipalities by sharing in the financial burden of operating and maintaining sewage treatment works, and at the same time to improve the performance of these municipal facilities. The program allows a qualified municipality to be reimbursed for 1/3 of the annual operation and maintenance costs of sewage treatment. This reimbursement is limited to eligible items only. In general, all cost involved in the actual treatment of wastes are eligible.

In order to be eligible for reimbursement of operation and maintenance costs, the municipality must meet the following requirements:

1. A qualified operator and sufficient operating staff must be employed.
2. During periods of maximum dry weather flow, all sewage must be received at the waste treatment facility.
3. An acceptable sewer use ordinance must be adopted and enforced.
4. Required laboratory analyses and physical measurements must be performed.
5. The facility must be constructed according to approved plans and operated according to design.
6. The facility must be operated in compliance with permit issued by the Health Department.
7. Monthly operating reports must be submitted to the local Public Health Engineer.
8. The facility must meet stream standards or be in compliance with an approved schedule for upgrading the treatment facility.

This last requirement is of special importance. If a municipal facility is not meeting stream standards, the municipality may still be eligible for operation and maintenance aid, if it is making satisfactory progress toward providing secondary (or tertiary) treatment. Adequate progress usually means that the municipality is meeting the dates in the time schedule established in the Commissioner's Order to abate pollution. In many instances this has served as an incentive for municipalities to make progress. Denial of operation and maintenance aid has made communities aware that the Health Department is not giving hand-outs to every municipality just because they have some type of treatment facility. As a result of this, many municipalities have proceeded on schedule to insure receipt of their operation and maintenance aid. Although a municipality [illegible] proceeding on schedule, it still must meet the other seven above requirements to be eligible for operation and maintenance reimbursement.

In the Lake Champlain Drainage Basin, there are 17 municipal treatment facilities. Of these 14 have participated in the State Operation and Maintenance Grant Program. The participating municipalities are listed in the following table. The three municipalities that did not participate in the program are Queensbury Town (Riverside Park Sewer District, Fort Ann Village and Ticonderoga Town (Claymore Sewer District). An application was never initiated by any of these communities.

Fourteen participating municipalities have submitted applications for fiscal years 1965, 1966, and 1967 for a total of $355,091. To date, $102,522 has been reimbursed. Two applications have been disapproved because the municipalities did not meet the requirements outlined above. Both disapprovals were in the 1967 fiscal year, one for the Village of Lake George and the other for the Village of Granville. It

OPERATION AND MAINTENANCE GRANT PROGRAM (cont'd)

should be noted that the 1967 Village fiscal year is from June 1, 1966 - May 31, 1967. Both of these villages have submitted applications for the State Operation and Maintenance Grants for the 1968 fiscal year and these are being processed.

Routine sampling and inspections are conducted at each municipal facility by State and/or County personnel. In addition, the Operation and Maintenance Engineer from the State inspects each facility at least once a year and more often when problems exist. This sampling and inspection program has shown that under the Operation and Maintenance Grant Program the overall performance of these municipal facilities have generally improved.

SEWAGE TREATMENT WORKS

OPERATION & MAINTENANCE GRANT PROGRAM

LAKE CHAMPLAIN DRAINAGE BASIN

Location	Type & Flow (MGD)	Total Operation Costs (Dollars)			Amount of State Aid (Dollars)		
		1965	1966	1967	1965	1966	1967
Plattsburgh (C) Saranac River C-15 (0.1)	Primary 4.2	$49,519	$45,198	$38,062	$16,506	$15,066	$12,687
Rouses Point (V) Lake Champlain C(0.8)	Primary 0.4	4,158	7,502	10,736	1,386	2,501	3,611
Danemora (V) Behan Creek C-15-1s (3.9)	Primary 0.3	2,861	2,965	5,351	954	988	1,622
Peru (T) SD No.1 Little Ausable River C-23 (8.8)	Primary No meter	5,661	*	*	1,887	*	*
Plattsburgh (T) Champlain Park S.D.	Primary No meter	4,746	*	*	1,582	*	*
Champlain (V) Big Chary River C-3 (5.3)	Primary 0.4	1,865	3,037	3,355	621	990	**
Moriah (T) S.D. No.1 Mill Brook C-86 (3.8)	Primary No meter	*	2,427	1,789	*	809	**
Moriah (T) S.D. No. 2 Trib. of Mill Brook C-86-5 (3.0)	Primary 0.1(EST)	*	4,359	4,134	*	1,453	**
Lake Placid (V) Chobb River C-25-26-35 (0.9)	Primary 1.8(EST)	7,326	*	7,624	2,442	*	2,541

Location	Type & Flow (MGD)	Total Operation Costs (Dollars)			Amount of State Aid (Dollars)		
		1965	1966	1967	1965	1966	1967
Port Henry (V) Lake Champlain C (76.2)	Primary 0.2	*	$ 4,666	$ 4,628	*	$ 1,555	$ 1,543
Saranac Lake (V) Saranac River C-15 (62.8)	Primary 1.1	7,193	8,008	13,267	2,397	2,669	4,422
Bolton (T) Bolton SD Ground Water Recharge	Teritary 0.2	7,229	9,001	8,618	2,410	3,000	2,873
Lake George (V) Ground Water Recharge	Teritary 0.6	16,902	25,210	35,548	5,634	8,403	***
Granville (V) Mettawee River C-134 (23.3)	Primary 0.5	*	*	2,146	*	*	***
TOTALS		$107,460	$112,373	$135,258	$35,819	$37,434	$31,840

* Municipality did not participate
** Applications being processed
*** Application disapproved

V

ENFORCEMENT PLAN

ENFORCEMENT PLAN

Prior to the adoption of the Pure Waters Program, the basic means for abating pollution was through the formal "Comprehensive Plan for the Prevention and Abatement of Pollution," developed on a drainage basin basis following the adoption of stream classifications and standards and the approval of the abatement plan by the Water Resources Commission as required under § 1210. Such plan for the Lake Champlain Drainage Sub-Basin was developed in August, 1958.

Since the Pure Waters Program became operative, significant changes in policy have enabled vigorous enforcement of the plan. The new policy was recited on September 21, 1965. In summary, the policy calls for stepped-up action in pollution abatement by combining the cooperative phase with the enforcement phase within the established legal framework of the enforcement procedures of the Pure Waters Program. Accordingly, hearings in accordance with the prescribed Rules and Regulations, will be held with a view toward issuance of Commissioner's Orders. The legal and engineering staff have been augmented to carry out the intensified program. The responsibility for the field work of evaluating pollutional situations and feeding information to the central system, such as case reports, lapse of schedules, etc., was given to the Regional offices in cooperation with their jurisdictional local health units.

Enforcement hearings are scheduled at the rate of about twenty per month. The importance category of the pollution, such as large pollution source, key problem, highly toxic pollution, sensitive receiving stream, is considered in determining priorities for hearing schedules. Since September 1965, 419 communities and industries have

ENFORCEMENT PLAN (cont'd)

been noticed for hearings. Of these, 371 have been issued orders and the remainder are in various steps leading to the issuance of Commissioner's Orders. To date, only a small number of hearings have been contested. Timetables for pollution abatement required by the orders, range in length from three months for simple problems to five years for the more complex pollutional situations such as those encountered in New York City. However, schedules of three to four years for final construction and operation of abatement facilities are the rule, except for extraordinary reasons where the schedules may be extended beyond the four-year period. The typical timetable allows for six months for preliminary plans and report, one year for the submission of final plans, and one to two years for the construction of facilities and completion of all works on or before 1971.

As indicated by the attached table, the Commissioner of Health has ordered 12 polluters to cease and abate pollution in the Lake Champlain Drainage Basin. The 8 remaining identified polluters are under Department directives to cease and abate pollution also.

It is the New York State Health Department's policy to require a minimum of secondary treatment. In the Lake Champlain Drainage Basin there are presently 15 existing primary plants. Ten of these are in the process of upgrading to secondary treatment and we are conferring with the other five.

ENFORCEMENT PROGRAM
LAKE CHAMPLAIN DRAINAGE BASIN

Table Explanation

Location - municipal subdivision location of non-municipal entities. (T) - Town, (V) - Village, (C) - City

Ownership: Individual - multiple private discharges; no sanitary sewers; community not legally responsible. If the community fails to install a municipal system, individuals must abate pollution individually or collectively.

Pop. or Flow - 1960 census population of community if known, residency and employment of institution or industrial waste flow of corporation.

Abatement Status

A - Under Commissioner's Orders

B - Hearing noticed to establish Commissioner's Order

C - Hearing to be noticed

D - Under Department directive (voluntary compliance)

1 - Identified
2 - Initial conference held
3 - Schedule established
4 - Solution established via preliminary report approval (including special study)
5 - Final plans submitted and approved
6 - Under construction
7 - Completion of construction, installation of facilities or internal modifications
8 - Abatement partically achieved
9 - Abatement achieved

Ordered construction completion - completion date of needed construction, established by Commissioner's Order

Voluntary construction completion - completion date of needed construction, established by Department directive 4/1/72 (expiration date of State grant program) indicates latest possible date; negotiations under way to establish finite schedule.

ENFORCEMENT PROGRAM
LAKE CHAMPLAIN DRAINAGE BASIN

Waste Source	Location	County	Receiving Waters	Effluent: Raw or Primary	Effluent Type	Ownership: Corp., Inst., Mun. or Ind.	Pop. or Flow	Abatement Status	Ordered Constr. Complete	Vol. Constr. Complete
Rouses Point (V)		Clinton	Lake Champlain	Primary	Sanitary	Municipal	2160	D-3		4/1/72
Plattsburgh (C)		Clinton	Lake Champlain	Primary	Sanitary	Municipal	20172	A-4	7/1/70	
Diamond National Corporation	Plattsburgh (C)	Clinton	Lake Champlain	Raw	Pulp and Paper	Corporate	1 mgd	A-4	7/1/70	
Georgia-Pacific Corporation	Plattsburgh (C)	Clinton	Lake Champlain	Raw	Pulp and Paper	Corporate	6 mgd	A-4	7/1/70	
Imperial Paper	Plattsburgh (C)	Clinton	Saranac L. Lk. Champ. Trib.	Raw	Pulp and Paper	Corporate	1 mgd	A-4	7/1/70	
J.J.Rogers Co.	Ausable Forks (H)	Clinton	Ausable R. Lk. Champ. Trib.	Raw	Pulp and Paper	Corporate	1 mgd	A-3	11/1/70	
Willsboro (H)	Willsboro (T)	Essex	Bouquet R. Lk. Champ. Trib.	Raw	Sanitary	Individual	867	D-4		4/1/72
Saranac Lake (V)		Essex	Saranac R. Lk. Champ. Trib.	Primary	Sanitary	Municipal	1.8 mgd	D-4		
Lake Placid (V)		Essex	Chubb R. Lk. Champ. Trib.	Primary	Sanitary	Municipal	.8mgd	A-4	5/1/71	

ENFORCEMENT PROGRAM
LAKE CHAMPLAIN DRAINAGE BASIN (cont'd)

Waste Source	Location	County	Receiving Waters	Effluent: Raw or Primary	Effluent Type	Ownership: Corp., Inst., Mun. or Ind.	Pop. or Flow	Abatement Status	Ordered Constr. Complet.	Vol. Constr. Complet.
Bloomingdale (V)		Essex	Twobridge Brook Lk. Champ. Trib.	Raw	Sanitary	Municipal	500	A-4	9/1/70	
Westport Sewer Association	Westport (V)	Essex	Lk. Champ.	Raw	Sanitary	Corporate	723	A-5		12/1/70
Port Henry (V)		Essex	Lk. Champ.	Primary	Sanitary	Municipal	1767	D-3		4/1/72
Crown Point (H)	Crown Point	Essex	Lk. Champ.	Raw	Sanitary	Individual	1600	D-4		4/1/72
Ticonderoga (V)		Essex	Ticonderoga Cr. Lk. Champ. Trib.	Raw	Sanitary	Municipal	3568	A-4	9/1/70	
International Paper Company	Ticonderoga (V)	Essex	Ticonderoga Cr. Lk. Champ. Trib.	Raw	Pulp and Paper	Corporate	13mgd	A-4	7/1/70	
Whitehall (V)		Washington	Barge Canal	Raw	Sanitary	Municipal	4016	A-4	9/1/70	
Delaware & Hudson R.R.	Whitehall (V)	Washington	Barge Canal	Raw	Oil	Corporate	---	B-2		
Granville (V)		Washington	Mettawee R.	Raw and Primary	Sanitary	Municipal	2715	A-4	1/1/70	
Comstock State Prison	Ft. Ann (T)	Washington	Barge Canal	Primary	Sanitary	Institutional	1500	D-4		1/1/69

ENFORCEMENT PROGRAM
LAKE CHAMPLAIN DRAINAGE BASIN (cont'd)

Waste Source	Location	County	Receiving Waters	Effluent: Raw or Primary	Effluent Type	Ownership: Corp.,Inst., Mun. or Ind.	Pop. or Flow	Abate-ment Status	Ordered Constr. Complet.	Vol. Constr. Complet.
Ft. Ann (V)		Washington	Barge Canal	Primary	Sanitary	Municipal	453	D-3		4/1/72

EXISTING PRIMARY PLANTS

LOCATION	SECONDARY UPGRADING STATUS	LOCATION	SECONDARY UPGRADING STATUS
Plattsburgh (C)	See Municipal Plan Review (P.48)	Lake Placid (V)	See Municipal Plan Review (P. 47)
Rousses Point (V)	Village requested to upgrade	Port Henry (V)	Plant built in 1964 - Village requested to upgrade
Peru (T)	Interviewing Engineer	Saranac Lake (V)	See Municipal Plan Review (P. 47)
Champlain (V)	Plant built in 1965 - Village requested to upgrade	Granville (V)	See Municipal Plan Review (P. 48)
Dannemora (V)	Engineer hired for upgrading - Joint project with Village & State Prison	Ticonderoga (T)	Engineer hired for upgrading
Champlain Park	Town requested to upgrade	Fort Ann (V)	Village requested to update
Moriah (T) S. D. #1 and S. D. #2	Operation and Maintenance Grant being held up till further progress. Also see Plan Review (P. 48)	Riverside Park	Going with Hudson Big Bend Project outside of Drainage Basin
		Champlain (V)	Plant built in 1965 - Village requested to upgrade

VI

PLAN REVIEW ACTIVITIES

PLAN REVIEW ACTIVITIES

Plan review and approval of water pollution control projects are expedited through engineering project evaluations. Following report approval, the construction plans and specifications are reviewed for approval and permit issuance. Further processing of reports, plans and specifications is necessary when Federal Construction Grants are involved.

Plan review provides assurance that new, reconstructed and modified sewer utilities are consonant with statutory and administrative requirements. Each project is evaluated to "build-out" structure and operating problems prior to construction. Project evaluation considers maximum value at minimal capital and operating costs, requiring attention to the broad areas of planning and the specific details of construction. Some of the more important considerations are:

1. Coordination with and evolution from areawide regional and drainage planning requirements.
2. Effect of treated waste discharge on receiving waters.
3. Flexibility of treatment process.
4. Adequacy of process hydraulics.
5. Features affecting plant and operator safety.
6. Economics of processing.
7. Effects of industrial waste discharges.
8. Adequacy of staffing and laboratory facilities for process control.
9. Disposal of separated sewage solids.
10. Project financing.
11. Necessary remedial work on collection system, particularly when combined systems exist or excessive infiltration occurs.
12. Evaluation of treatment process with respect to maximizing

PLAN REVIEW ACTIVITIES (cont'd)

pollutant removals and protecting receiving stream water quality.

The permit system for approving sewage discharges to waters of New York State has been in operation since 1903 under provisions of the Public Health Law. The State Water Pollution Control Act updated the system to include all waste discharges. As of January 20, 1968, under Part 73, Title X of the Official Rules Codes and Regulations of the State of New York, the Department of Health adopted a two permit system (Construction Permit and Operation Permit). Attached is a recent copy of the construction permit form. Permit issuance is based on approvals of engineering reports, plans and specifications. In administering the procedure for submittals of approvable plans, the Department issues to engineers technical bulletins containing interpretive information, guidelines and policies.

Inventory data processing systems are in operation to tabulate significant information on all municipal, industrial, and institutional, and commercial waste treatment projects. The system has been expanded to include new information required on the registration of all industrial waste outlets. Rules, regulations and standards have been promulgated (10NYCRR75) as required by this new stature (Chapter 595, Laws of New York State, 1966).

Included is information summarizing the plan review activities in the Lake Champlain Drainage Basin since the initiation of the Pure Waters Program.

APPROVED TREATMENT FACILITIES
LAKE CHAMPLAIN DRAINAGE BASIN
SINCE SEPTEMBER, 1962

Project	Location	Approval Date	Design Flow (mgd)	Cost	Comments
Champlain (V)	Clinton Co.	March, 1963	.262	$ 400,000	Imhoff tank
Port Henry (V)	Essex Co.	January, 1964	.4	308,000	Imhoff tank
Lake George (V)	Warren Co.	July, 1964	1.745	300,000	Trickling Filter additions to existing S.T.P.
Keesville (V)	Clinton Co.	June 1967	.316	1,440,000	Trickling Filter

ACTIVE INDUSTRIAL WASTE
PLAN REVIEW PROJECTS
Lake Champlain Drainage Basin

Projects	Location	Comments
International Paper Co.	Ticonderoga (V)	Engineering report given NYSHD concept approval 9/9/68. Treatment Process - Aerated Lagoons - Secondary Settling. Treatment Efficiencies - greater than 90% over all removal of suspended solids and BOD. Design Flow - 21 mgd. Receiving Waters - Design was evaluated to conform to Vermont's Dissolved Oxygen requirements.
Diamond National Corp.	Plattsburgh (C) Clinton Co.	Joint municipal and industrial waste treatment project For further details see Plattsburgh (C) - Municipal Plan Review activities.
Georgia-Pacific Corp	"	
Imperial Paper Co.	"	
J & J Rogers Co.	Black Brook (T) Clinton Co.	Engineering report submitted to and disapproved by NYSHD on 10/14/68. Report returned to design engineer for revisions.

ACTIVE MUNICIPAL WASTE
PLAN REVIEW PROJECTS
LAKE CHAMPLAIN DRAINAGE BASIN

Project	Location	Design Flow (mgd)	Design Population	Cost	Comments
Elizabethtown (V)	Essex Co.	.15	1100	$ 880,000	Sewers and Treatment Plant-High Rate Trickling Filter with Chlorination Prelim. appd. 5/13/66
Willsboro (H)	Essex Co.	.12	1720	738,200	Sewers and Treatment Plant-Process - Extended aeration and chlorination Prelim. report appd. August, 1966
Crown Point (T)	Essex Co.	.12	1100	653,190	Treatment Facilities-Extended aeration and chlorination Prelim approval 3/16/67
Whitehall (V)	Washington Co.	.75	500	1,747,300	Sewers and Treatment Plant-Activated Sludge and chlorination Prelim. report appd. 4/1/67
Saranac Lake (V)	Franklin Co.	2.0	15100	1,081,300	Sewers and Treatment Plant-Activated sludge and chlorination Report appd. Aug. 4, 1967
Lake Placid (V)	Essex Co.	.8	4200	1,141,519	Sewers and Treatment Plant-activated sludge with clorination Report appd. Sept.11, '67

ACTIVE MUNICIPAL WASTE
PLAN REVIEW PROJECTS
LAKE CHAMPLAIN DRAINAGE BASIN (cont'd)

Project	Location	Design Flow (mgd)	Design Population	Cost	Comments
Ausable Forks (H)	Jay (T) and Black Brook (T) Clinton and Essex Co.	.25	2300	$ 544,305	Sewers and Treatment Plant-Extended Aeration with chlorination Prelim. Plans Appd. 10/2/67
Moriah (T)	Essex Co.	.1	6650	1,760,000	Sewers and Treatment Plant-High rate trickling filter and chlorination Report appd. 10/23/67
Plattsburgh (C)	Clinton Co.	21		8,886,000	Joint project with Paper Mills- Air Force Base and University - Process - Activated sludge with chlorination Report appd. 2/1/68
Granville (V)	Washington Co.	.65	4000	1,120,000	Treatment Facilities- High Rate trickling filter with chlorination Report appd. 2/16/68 Final Plans under FWPCA review
Bloomingdale (V)	Essex Co.	.075	700	508,700	Sewers and Treatment Plant-Extended Aeration with chlorination Prelim. report appd. 4/13/68

ACTIVE MUNICIPAL WASTE
PLAN REVIEW PROJECTS
LAKE CHAMPLAIN DRAINAGE BASIN (cont'd)

Project	Location	Design Flow (mgd)	Design Population	Cost	Comments
Great Meadow Correctional Institution	Ft. Ann (T) Washington Co.	.356	1700	$ 500,000	Treatment Facilities - Grease removal - high rate trickling filters and chlorination Report appd. 9/30/68
Westport (V)	Essex Co.	.12	1500	795,000	Sewers and Treatment Plant Extended Aeration and chlorination Final Plans being processed for grant application

PERMITS ISSUED FOR THE
Lake Champlain Drainage Basin
Since September, 1962

Distribution by Service Units and Type of Project

Service Unit	SS	STW	PS & FM	SS STW PS & FM	SS STW	SS PS & FM	STW PS & FM
City	4						
Town	3					4	
Village	8	1		2	1	1	
Public Assembly non-rec.		2					
Schools		10			2		
Paper Ind.				1			
Gas Station/ car wash		7					
Rec. Camps	1	1					
Misc. Comm. Est.		1					
Public Assembly rec.		1					1
Food Preparation		4					
Retail Stores	1	2					
Shop. Centers		1					
Temp. Res.	1	5			1		
Private Ind.					1		
Private other		1					
Off. Bldg.		3					

SS - Sewer system
STW - Sewerage treatment works
PS & FM - Pumping Station and Force Main

Total No. of Permits - 71

Total Estimated Construction Cost - $4,763.300

NEW YORK STATE DEPARTMENT OF HEALTH

PERMIT TO CONSTRUCT A WASTE DISPOSAL SYSTEM

This permit is issued under the provisions of Article 12 of the Public Health Law and 10 NYCRR 73.

1 Name of Permittee:	2. Location of Works (C,V,T):	3. County:	4. Entity or Area Served:

By initiating construction of the approved works, the permittee accepts and agrees to abide by and conform with the following:

1. THAT the construction permit shall be maintained on file by the permittee.
2. THAT the permit is revocable or subject to modification or change pursuant to Article 12 of the Public Health Law.
3. THAT the facilities shall be fully constructed and completed in compliance with the engineering report, plans and specifications as approved.
4. THAT the facilities shall not be placed in operation until construction has been completed and an operation permit has been issued, or unless ordered to be operated by the Commissioner or by a Court.
5. THAT the construction of the facilities shall be under the supervision of a person or firm qualified to practice professional engineering in the State of New York under the Education Law of the State of New York, whenever engineering services are required by such law for such purposes.
6. THAT where such facilities are under the supervision of a professional engineer, he shall certify to the Department and to the permittee that the constructed facilities have been under his supervision and that the works have been fully completed in accordance with the approved engineering reports, plans, specifications and permit.
7. THAT the construction of the facilities shall commence by ____________________
   and be fully completed by ____________________.

ISSUED FOR THE STATE COMMISSIONER OF HEALTH | DATE

Designated Representative

Distribution: White – Applicant; Pink – Central Office (BED); Yellow – File (LHO or DHO); Green – Other

San. 2 (rev. 11/67)

Project Description:

5. Type of Ownership:

☐ Municipal ☐ Commercial ☐ 68 Private-Other ☐ 1 Authority ☐ 30 Interstate

☐ Industrial ☐ 6 Sewage Works Corp. ☐ Private-Institutional ☐ 19 Federal ☐ 40 International

__________ ☐ 67 Private-Home ☐ 26 Board of Education ☐ 20 State ☐ 18 Indian Reservation

6. Type & Nature of Construction:

Collection: ☐ 1 New ☐ 2 Additions or Alterations

Treatment and/or Disposal: ☐ 1 New ☐ 2 Additions or Alterations

7. Estimated Cost of Construction:

Collection System ________________ Treatment and/or Disposal ________________

8. Type of Waste: ☐ 1 Sewage ☐ Industrial ☐ Other

Specify ________________ Specify ________________

9. Degree of Treatment:

☐ 1 None ☐ 3 Primary ☐ 5 Secondary ☐ 7 Complete

☐ 2 Septic Tank ☐ 4 Intermediate ☐ 6 Tertiary ☐ 8 Not Applicable

10. Point of Discharge:

Location (C,V,T) ________________ Major Drainage Basin ________________

Surface Water: Name of Watercourse ________________ Surface Water Class ________________

Ground Water: Name of Watercourse to which ground water is tributar ________________ Ground Water Class ________________

11. Name of Receiving Treatment Works:

12. Grade of Plant Operator Required:

13. Disinfection Required: ☐ 1 Continuous ☐ 2 Seasonal ☐ 3 None

14. Design Flow (Gals./day):

15. Design Equivalent Population (BOD Basis):

16. Design Plant Efficiency (% BOD Removal):

Description of works, such as number, name and capacity of units:

VII

CONSTRUCTION GRANT PROGRAM

CONSTRUCTION GRANTS PROGRAM

The principal obstacle to pure waters in New York State, lack of local funds, has been removed through Federal-State construction grants programs. Over the years New York State has fully utilized the Federal share under Public Law 660 or Public Law 87-88 within the dollar-ceiling limits.

The State construction program provides for 30% of the cost, guaranteeing a 60% grant without dollar limitations, for construction of eligible municipal sewage treatment plant and interceptor facilities. The Federal Water Pollution Control Act, as amended by the Clean Water Restoration Act of 1966, provided greater Federal appropriations for eligible construction projects. Under the amended Federal statute, dollar-ceiling limits have been eliminated. Also, by virtue of the statute and New York State providing grants greater than 25% to the municipality, qualifying projects can be supported by Federal grants of 40%. An additional 10% may be granted for projects since New York State's quality standards were approved. Also, an increase in the amount of the grant by 10% may be made for projects conforming with comprehensive planning for a metropolitan area. New York State's present construction program is geared to meet all Federal requirements for a total eligibility of 50% or 55% of construction costs as the Federal share. The Pure Waters Bond Act provides one billion dollars of construction aid until March 1972 for the estimated 1.7 billion dollar program.

It is expected that the construction program will advance at a greater rate as "Comprehensive Studies and Reports" are completed (See

CONSTRUCTION GRANTS PROGRAM (con't)

section under Waste Water Utilities Planning). Design and construction of sewerage projects, of course, will tax the capabilities of consulting engineering firms in New York State. In consideration of the vigorous enforcement of industrial pollution abatement, there will be another substantial demand on consulting engineering resources. As a preventative measure in the development of backlogs in plan reviews and approvals, State procedures have been streamlined by adoption of project evaluation techniques for approvals of reports, plans and specifications.

As of September 30, 1968, New York State has 317 construction grant projects that are either under design, construction or have been completed. Additionally there are an estimated 280 pending projects. These 597 projects represent an estimated total construction cost of over 2 billion dollars and the eligible amount for State Construction Grants exceeds the 1 billion dollars provided by the referendum.

The attached table summarizes the construction grants activities in the Lake Champlain Drainage Basin. In the Drainage Basin the actual Federal Grant participation is only 3% of the eligible portion whereas the State Grant participation is 57% of the eligible portion.

LAKE CHAMPLAIN DRAINAGE BASIN
CONSTRUCTION GRANTS PROJECTS

September 30, 1968

Project Number	Applicant	County	Eligible Project Cost Federal	Eligible Project Cost State	Grant Amount Federal	Grant Amount State
194	Lake George (V)	Warren	292,222	62,855	145,500	18,856
353	Keeseville (V)	Clinton	660,260	660,260	35,000	361,150
521	Plattsburgh (C)	Clinton	9,900,000	9,900,000	99,000	5,851,000
488	Bloomingdale (V)	Essex	232,529	232,529	2,325	137,192
442+	Lake Placid (V)	Essex	1,407,000	1,407,000	15,470	830,130
180	Port Henry (V)	Essex	343,600	74,349	162,500	22,304
522	Westport (V)	Essex	458,000	458,000	4,580	270,220
443+	Saranac Lake (V)	Franklin-Essex	1,081,300	1,081,300	11,890	637,967
284	Lake George (T)	Warren	590,300	590,300	177,090	177,090
466	Granville (V)	Washington	629,500	629,500	6,295	371,405
		TOTALS	15,594,711	15,096,093	659,650	8,677,314

VIII

SPECIAL PROGRAMS

SPECIAL PROGRAMS

Lake Champlain Studies:

The State of New York has conducted or participated in the following studies of Lake Champlain.

1. A two year field survey within the Lake Champlain Drainage Basin was initiated in November 1951. The results of this work is summarized in "The Lake Champlain Drainage Basin Preclassification Survey Report - 1954."

2. The New York State Health Department participated in a joint study in August 1966 with the State of Vermont Water Resources Commission and the FWPCA. This study was under the auspices of the Hudson-Champlain and Metropolitan Coastal Comprehensive Project. This was an Industrial Waste Survey regarding International Paper Company at Ticonderoga (V).

3. The State of New York participated with the FWPCA North Atlantic Water Quality Management Center study of Lake Champlain in August 1968.

Stream Protection:

Under a new State law, local government as well as private interests in New York State are now required to obtain approval of the State Conservation Department before starting construction projects affecting streams and navigable waters in the State. The new Stream Protection Law (Chapter 955, Laws of 1965), effective on January 1, 1966, authorized the State Water Resources Commission to regulate construction, dredging and land fill projects which might impair the quality and recreation or conservation value of surface waters in the State.

The Water Resources Commission has designated the State Conservation Department as its agent for administering this new law. The Stream Protection Law requires for the first time that local governments obtain a permit or enter into a regulatory agreement with the State Water Resources Commission before starting a project which might disturb the beds of certain streams which are classified as best used for drinking supplies, bathing or fishing. In cases where water supply intakes, waste outlets or public bathing areas may be affected by the proposed project, consultation with the Health Department is required (Rules and Regulations, Part 332). In addition, the new law transfers to the State Water Resources Commission from the State Superintendent of Public Works the authority to issue permits for:

> Dredging or placing fill in all navigable waters in the State, except tidewaters bordering Nassau and Suffolk Counties.
>
> Construction, repair or reconstruction of certain dams, docks and impoundment structures.

Boat Pollution:

Chapter 897, Laws of New York, 1966, provides for regulating the disposal of sewage from watercraft and marinas. The New York State Conservation Department is charged under Sec. 33-C of the Navigation Law with administering this law. Holding tanks and incinerators are being considered as the only acceptable pollution control devices to protect the quality of New York's Waters. Devices which provide complete treatment of a vessel's sewage may be approved in the future. While the law became

SPECIAL PROGRAMS (con't)

effective in August 1966, the provisions requiring the water pollution control device take effect March 1, 1969.

INCOCHAMP:

The Interstate Commission on Lake Champlain Drainage Basin (INCOCHAMP) was recognized on May 31, 1966, by the State of New York (Ch. 445) as an agency of the State in implementing cooperation between New York State and the State of Vermont to develop plans and make recommendations for the development of this region to the governors, legislators, agencies and political subdivisions of both states and in implementing similar cooperation between New York, Vermont and the Province of Quebec.

In addition to INCOCHAMP, the State of New York participates with the following agencies having responsibilities over Lake Champlain:

1. Richelieu River Control Board
2. International Lake Champlain Control Board
3. U. S. Army Corps of Engineers
4. New England Interstate Water Pollution Control Commission
5. Champlain Bridge Authority
6. Northeast Fire Protection Board

Pure Waters Authority:

The New York State Pure Waters Authority, established in September of 1967, assists local municipalities or groups of municipalities to plan, finance, construct, maintain and operate wastewater treatment facilities, sewage collecting systems and solid waste disposal facilities. The Authority is unique in that it has financial and operational capabilities. It can provide full-time attention to project development, construction and operation by teams of experienced administrators, engineers, attorneys and municipal financial specialists.

The Pure Waters Authority is completing arrangements to construct and operate a wastewater treatment plant for the Village of Westport in Essex County. Formal proposals for similar service have been submitted and are being considered by the following municipalities:

Keeseville (V)	Clinton and Essex Counties
Bloomingdale (V)	Essex County
Schroon (T)	Essex County
Granville (V)	Washington County

Preliminary wastewater treatment negotiation is under way with the hamlet of Ausable Forks in Clinton and Essex Counties. Also, the Authority is in contact with the City of Plattsburgh and the Towns of Plattsburgh, Beekmantown and Schuyler Falls concerning the development of a regional solid waste disposal operation.

Oil Pollution:

The following activities are now being conducted in the State of New York regarding oil pollution:

1. A State research project is underway regarding the development of equipment and techniques to cope with oil pollution reaching surface waters. When this project is finished, the information will be made available on a statewide basis and used to establish oil pollution control programs, such as the development of sites to store emergency equipment to combat major oil spills.

2. New York State is cooperating with interstate and Federal agencies and has developed a comprehensive communications system to fit in with the Federal Government's contingency plan regarding major oil spills.

3. The New York State Health Department and the New York State Petroleum Council are currently conducting a program to evaluate various sources of possible oil pollution and developing a program of corrective action.

MR. HABERER: Mr. Chairman, I also want to mention that Mr. Frank Bogedain is available here today. He is Director of Bureau of Engineering Design; also Mr. Andrew Weist and Mr. Anthony Adamczyk are here, both from the Regional Office in Albany and they have been instrumental in preparing the report. We also have Mr. Pfeiffer and Mr. Benson from the Conservation Department. I want to mention their names in case questions come up and I can refer the questions to these people.

Now, I have a list of people who have written in and asked for an opportunity to make a statement. Apparently, some of these are not here but I will call their names off anyway in case there is a representative sent in their stead. Mr. Moon of the State Department of Transportation; Mr. Crandall or Mr. Drogin of the State Office of Planning Coordination; Mr. Hennigan of the State University and College of Forestry- going going, gone, that's three. Mr. Handley of the Pure Waters Authority wished to be here today and called me last night to explain that he was not able to make it because of the weather, but he wishes to present a formal statement and send it in to you.

MR. KLASHMAN: We will hold the record open for ten days and if Mr. McMorran, Mr.Drogin or Mr. Hennigan or anybody else wishes to submit a statement, we will include it in the written record. (The record was held open and the above-mentioned statements were submitted and follow.)

STATE OF NEW YORK / DEPARTMENT OF TRANSPORTATION
1220 WASHINGTON AVENUE • STATE CAMPUS • ALBANY, NEW YORK 12226

J. BURCH McMORRAN
COMMISSIONER

November 27, 1968

Mr. Lester Klashman, Regional Director
Federal Water Pollution Control Administration
U. S. Department of the Interior
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Dear Mr. Klashman:

You will find enclosed a copy of the statement which was to be presented at the Lake Champlain Enforcement Conference in Burlington, Vermont on November 13, 1968.

This is the only statement which will be submitted from the New York State Department of Transportation.

Please make this statement a part of the record of the Conference.

Very truly yours,

J Burch McMorran

J. BURCH Mc MORRAN
Commissioner

cc: John C. Haberer
Arthur Moon

STATEMENT ON POLLUTION PROBLEM IN CUMBERLAND BAY, LAKE CHAMPLAIN, PLATTSBURG, NEW YORK

The New York State Department of Transportation maintains Barge Canal Terminals on Lake Champlain at Port Henry, Plattsburg and Rouses Point as a part of the Barge Canal System. Construction of these terminals commenced in 1913 and was completed, after a delay caused by World War I, in 1922 at a total cost of $270,000. These terminals offer commercial dockage as follows:

Port Henry	-	500 Ft.
Plattsburg	-	1080 "
Rouses Point	-	440 "

The approach channels and harbors at the terminals were excavated to provide adequate depths of water for commercial craft using the facilities. During the years since the original construction maintenance dredging has been required occasionally.

Maintenance of the harbor and approach channel to the Plattsburg Terminal has been in the past, and continues to be, a major problem due to the discharge of sludge-like wastes which enter Cumberland Bay from a stream entrance located near the northerly side of the terminal dock. The material from the stream is allegedly a waste product from the operation being carried out by the Georgia-Pacific Company, located nearby. During the 1951 navigation season 180,000 cubic yards of material were excavated from the harbor and entrance channel. In 1962 36,000 cubic yards of material were taken from the same area. A substantial part of this excavation is made up of material discharged from the above-mentioned stream.

The nature of the waste material is such that it cannot be readily moved by conventional dredging equipment. It is a very light material which returns to a suspended state when only slightly disturbed by outside activity. Thus, a clamshell or dipper dredge cannot be used for removal, because such equipment cannot pick up and load such suspended material effectively. For the same reason a hydraulic dredge is very inefficient. Its use requires the moving of vast quantities of water in order to move a small amount of solids. If future removal is to be attempted using hydraulic dredges the design of the spoil area will have to be carefully researched, as special equipment or design will be required to filter or settle out the solid wastes.

The principal commercial use of the Plattsburg Terminal facility for many years has been the docking of oil tankers to discharge product into adjacent tank farms for subsequent distribution to consumers in the area. This is an important function, since pipelines have not penetrated the Lake Champlain valley, and oil products must be brought in by barge, rail or truck. The use of the terminal by tankers dates back to 1922 in the case of one oil company, and to 1935 and 1939 in the cases of the other two present users.

Previous to 1965 the pipelines into which the product was discharged from the tankers were situated in such a way that the tankers were tied up on the north wall of the terminal dock. As noted above, it is adjacent to this wall that the stream discharging wastes is located.

Following the 1962 dredging program it soon became apparent that similar programs would be required each year or two because of the quantity of material being discharged from the stream. Because of the difficulty of removing this material such a dredging program was felt to be unwise, and so it was decided to abandon the north terminal wall. In early 1965 the three oil companies were advised of this decision and told to relocate their discharge pipes to the south wall. This was done, and no dredging has been undertaken since.

An inspection of the terminal area in early September, 1968, revealed that the north terminal wall now borders on a sludge bed rather than on water of navigable depth as was the case only 3½ years ago. Indeed, the sludge deposits appear to be extending around the end of the dock, and it would appear to be only a matter of time until the entire dock will be rendered unusable.

It should be noted that the Georgia-Pacific Paper Company maintains and uses a water intake situated at the land end of the south wall. The action of the tankers in landing at this wall for discharging of cargo occasionally causes a "roiling" of the water near the intake and a subsequent complaint from the Paper Company. It appears that the "roily" condition is caused by the existence of the sludge in the area, and that the company itself is responsible for the problem about which it complains.

It is the concern of the New York State Department of Transportation that the sludge banks will continue to grow to a point that the terminal dock is rendered completely unusable, or that in order to retain its usefulness, extensive and costly dredging programs would have to be undertaken. The Department feels that it should not be faced with only these two alternatives. Rather, the removal of the sludge banks should be included as a part of the pollution control programs now underway. The people of the area, who are the ultimate beneficiaries of the terminal through the availability of petroleum products delivered there, should not be penalized through higher costs for the products they use because of the discontinuance of the use of the terminal or unnecessary dredging to retain the terminal.

Statement of the
New York State Office of Planning Coordination
at the Lake Champlain Enforcement Conference

November 13, 1968
Sheraton Motor Inn
Burlington, Vermont

Gentlemen:

My name is Shepard B. Drogin. I am a Principal Planner in the Albany District Office of the New York State Office of Planning Coordination, and I am appearing before you today as a representative of Mr. Charles T. Lanigan, Director of that Office.

The New York State Legislature created the Office of Planning Coordination in 1966, "to advise and assist the governor in the coordination of the development planning activities of the State with those of the Federal Government, local governments and governments in other States, and in the conduct of comprehensive development planning activities for the State and the various areas and regions of the State". Under this mandate, the Office of Planning Coordination has placed strong emphasis on regional planning and has demarked for the State 12 multi-county planning regions. The boundaries are based generally on the common interests and problems of the counties so grouped. One of these regions, designated as the Lake Champlain-Lake George Region, covers the New York State side of Lake Champlain, and comprises the counties of Clinton, Essex, Hamilton, Warren and Washington.

The Lake Champlain-Lake George Regional Planning Board was offically organized in October of 1967. The Boards of supervisors of each respective county had previously adopted resolutions authorizing county participation in establishing a regional planning board. Members of the board include the chairman of each county board of supervisors, the county treasurers, the county superintendents of highways and three citizens appointed by each board of supervisors.

The Regional Planning Board is providing a mechanism for fostering integrated planning, overall direction and leadership among the private and public agencies concerned with the region's development. The board is adding a new and vital dimension by providing a means for tackling cooperatively the complex problems which lie beyond the effective reach of any individual agency or government.

The comprehensive regional planning and development work program being undertaken by the Lake Champlain-Lake George Regional Planning Board is providing the basic framework for all levels of comprehensive planning in the Lake Champlain-Lake George Region. The regional work program has been designed to be compatible with county, city and local comprehensive planning programs within the Region and will include work elements specifically concerned with the coordination of all local planning efforts within the Region as well as the planning activities of Federal and State agencies. At present, staff of our Albany District Office is assisting the Regional Planning Board in initiating its work effort.

The growing pollution of Lake Champlain is only one of the comprehensive planning elements that the regional planning board is concerned with.

Certainly from a long-range planning point of view the rapidly increasing use of our water bodies, together with their growing pollution cannot continue without seriously affecting the entire recreational economy of the region.

The solutions to these and other pollution problems appear to lie in a comprehensive planning program for the State in which growth and development can be appropriately channeled and anticipated, indiscriminate and unsanitary land uses properly controlled and broad ranged recreational and industrial development adequately and intelligently conceived and located. We will be working closely with our local, regional and State health authorities on these matters.

With the regional planning process well advanced in this area, it appears that any additional Federal or interstate effort should be tied to and coordinated with the ongoing planning process recognized by the State and local governments. While pollution is a problem, it does not stand by itself, and its correction will require coordinated effort by all units of government.

Thank you

STATE OF NEW YORK
EXECUTIVE DEPARTMENT
OFFICE OF PLANNING COORDINATION
488 BROADWAY
ALBANY, N.Y. 12207

CHARLES L. CRANGLE
ASSISTANT DIRECTOR

November 15, 1968

Mr. Lester Klashman
Regional Director
Federal Water Pollution
Control Administration
J.F.K. Federal Office Building
Boston, Massachusetts 02203

Dear Mr. Klashman:

I regret that because of weather conditions, our representative, Mr. Shepard Drogin, was unable to attend the Lake Champlain Enforcement Conference at Burlington on November 13.

I understand, however, that you have indicated the meeting would not be closed for 10 days to make possible the receipt of additional testimony.

I am, accordingly, enclosing a copy of the testimony Mr. Drogin was prepared to give for this office, and we appreciate the opportunity to participate.

Sincerely,

Charles L. Crangle

Enc.

HOLLIS S. INGRAHAM, M.D.
COMMISSIONER

STATE OF NEW YORK
DEPARTMENT OF HEALTH

84 HOLLAND AVENUE
ALBANY, NEW YORK 12208

ENVIRONMENTAL HEALTH SERVICES

DWIGHT F. METZLER, P.E.
DEPUTY COMMISSIONER

DIVISION OF PURE WATERS
JOHN C. HABERER, P.E.
ASSISTANT COMMISSIONER

November 20, 1968

Mr. Lester M. Klashman
Regional Director
Federal Water Pollution Control Administration
J. F. K. Federal Office Building
Boston, Massachusetts 02203

Dear Mr. Klashman:

Attached are three copies of a statement prepared by Mr. Arthur Handley on behalf of the New York State Pure Waters Authority.

Mr. Handley was unable to make the conference because of weather conditions.

Very truly yours,

JHaberer

John C. Haberer, P. E.

JCH/lm
attachments

My name is Arthur Handley, and I am Director of Waste Management Services of the New York State Pure Waters Authority. The purpose of my statement is to familiarize the Federal and Vermont conferees with New York State's newest water pollution control instrument. You are all familiar with the accelerated Pure Waters Program which was launched in November 1965 when 4 out of every 5 voters approved our $1 billion construction grant bond issue. Other planks of this original Pure Waters Program included:

- industrial incentives
- increased research
- expanded comprehensive sewerage needs studies
- streamlined enforcement procedures
- upgrading treatment facilities at State institutions
- automation of our water quality monitoring network.

This original program firmly established New York State's role in the Federal-State-local partnership to abate water pollution. The program has flourished and matured on a state-wide basis. And when it became apparent in 1967 that local municipalities needed still greater assistance to reach the Pure Waters Program goals, the Pure Waters Authority was created by the Legislature.

The Pure Waters Authority, designed to assist municipalities, is, in effect, itself a municipality. It can receive grants, design, construct, own and operate wastewater treatment and sewerage collection systems.

The Pure Waters Authority is a public benefit corporation with a membership of five - the Commissioner of Health, the Commissioner of the Office for Local Government, and three members appointed by the Governor with the advice and consent of the Senate.

Statement by Mr. Arthur Handley, Director of Waste Management Services, New York State Pure Waters Authority, at the Lake Champlain Federal Water Pollution Enforcement Conference, Burlington, Vermont, November 13, 1968.

The Authority is a service unit created to help municipalities. It does not make grants of State funds for sewage treatment works; that is the responsibility of the State Health Department. It does not make or enforce rules with respect to pollution control. This again is a Health Department function. What the Authority can do is assist local communities in bearing the financial and administrative burdens of carrying out their responsibilities under the Pure Waters Program and also in handling solid waste disposal problems.

This may be done by providing funds to the communities at more favorable interest rates than they would otherwise have to pay; by providing technical assistance of a caliber not readily available to a single community; by distributing the cost of such services over a broader base; and by providing managerial assistance in the development, execution and operation of multi-community projects.

The purposes of the Pure Waters Authority are broadly defined in the law as "the planning, financing, construction, maintenance and operation of sewage treatment works and solid waste disposal facilities, the construction on behalf of municipalities of sewage treatment works, sewage collecting systems and solid waste disposal facilities, and the assistance of municipalities in the planning, financing, construction, maintenance and operation of sewage treatment works, sewage collecting systems and solid waste disposal facilities . . ."

The Authority can only do, for a municipality, those things that the municipality can legally do on its own. Also, the Authority has no power to initiate projects; it must be asked to undertake a project by one or more units of local government. But within these limitations the Authority can provide a wide range of services - planning, construction, operation, maintenance, financing - individually or in any combination. Further, the financial arrangements under which the locality pays for the Authority's services are flexible, and many variations are possible.

Let me give you some illustrations of assistance given to local municipalities by our technical, legal, financial and administrative teams.

- Earlier this month we were able to offer an upstate municipality temporary financing for sewage works facilities at an interest rate of 3.12%. Their rate on the open market was 3.9%.
- We are contracting with a village for the construction of a collection and treatment facility. Since the treatment works will be owned and operated by the Authority, we are able to offer a level annual payment scheme for that portion of the project.
- The Authority is managing an engineering study on behalf of a major county in New York State to investigate the feasibility of rail haul as a part of their waste disposal system. In this case, the Authority is pre-financing the study on behalf of the county.
- The Authority is providing legal assistance to a county for the organization of a part-county sewer district. An earlier effort by the county failed because of legal complications and oversights.
- The Authority assisted a city to meet its temporary financing commitments by providing legal and financial consultation.

These are but a few of the diversified service activities in which we have been engaged. Routine work is associated with "turn key," "lease purchase" or total service projects for municipalities.

Earlier, I reported that the Authority is a public benefit corporation. This implies that we are a non-profit corporation and further that we must pay our own way. With the exception of first instance money, the Authority does not receive funds from the annual State budget. Therefore, a fee system, based on the cost of our services, is charged to the municipalities that contract with us. In short, we are "non-profit" but not "charitable." As a public utility, we must operate on a self-sustaining basis, even if not on a profit basis. We are not like the business venture that was failing and posted a plaintiff sign in its window which read: "This Is a Non-Profit Institution - But It Was Never Planned to Be!" Ours is - and it was planned that way!

The Pure Waters Authority, then, is unique in that it has financial and operational capabilities. It can provide full-time attention to project development, construction and operation by teams of experienced administrators, engineers, attorneys and municipal financial specialists.

The Pure Waters Authority is completing arrangements to construct and operate a wastewater treatment plant for the Village of Westport in Essex County. Formal proposals for similar services have been transmitted to the following municipalities in this drainage basin:

Keeseville (V)	Clinton and Essex Counties
Bloomingdale (V)	Essex County
Schroon (T)	Essex County

As the result of a public meeting at the Village of Bloomingdale on November 4th, it is expected that the Authority will enter into contract for the construction of a wastewater treatment facility to serve that Village.

The Pure Waters Authority is staffed and ready to assist other municipalities in the Champlain drainage area to meet their commitments to abate water pollution.

MR. HABERER: I would like to call at this time Mr. Peter Paine of the Lake Champlain Committee, who has expressed a wish to make a statement.

STATEMENT OF MR. PETER PAINE OF THE LAKE CHAMPLAIN COMMITTEE, WILLSBORO, NEW YORK

MR. PAINE: I don't have a prepared statement and I will try to be as brief as possible. I think certainly under 10 minutes.

For the Federal people, I think we are well known to Mr. Thieme and his New York colleagues. For the Federal people, the Lake Champlain Committee was founded in 1963. Principally, it opposed the construction of a seaway through Lake Champlain - opposition which was successfully concluded, I am pleased to say. And, ever since that time, we have devoted a major portion of our efforts as a nonprofit citizen's group, which numbers several hundred members on both sides of the lake, to clean up the lake - efforts to abate pollution in all forms in the lake.

I can say to you that we have waited a long time for this Conference today. We are absolutely delighted that you are here and we wish you the very best of success in your efforts.

We feel that the recreational value of this lake is of enormous importance to this area and to preserve the purity of its waters is one of the single-most important tasks we face. I think it is quite possible to compute in dollars and cents what this lake means to us here in this area, with tourism such a significant portion of the contributions to the economies of both States. We feel that every effort must be made to preserve the purity of the waters and to clean up the existing sources of pollution.

Now, I have a couple of specific questions and a couple of areas I would like to touch on. First of all, if I might turn to the question of Ticonderoga, which is perhaps the motivating force behind the meeting here today, we have consistently taken the view that this condition must be corrected. I am hopeful that in the flurry about the new plant that I.P. is constructing in Ticonderoga, and the very substantial amount of money that they are apparently going to expend to be certain that the new plant does not contribute in any way, whether biologically or from the sludge standpoint or thermally, to pollution of Lake Champlain, that we will not overlook the fact of the very serious existing condition that exists in Ticonderoga Creek. I am hopeful that out of this Conference will come an attempt to dredge the existing sludge deposits in Lake Champlain and to eliminate the pollution coming both from I.P. and from the Town of Ticonderoga. I don't think that this requires that I.P. mill be shut down. I would like to draw your attention to the fact that when we asked whether the construction of the new mill would result in the closing of the old mill, at the annual meeting of our Committee back in the summer, we received a very evasive and noncommittal reply. So I think you gentlemen should bear in mind that I.P. operation, the old I.P. operation, is likely to continue for a number of years and the construction of a new mill may not necessarily be the end to the problem. So we wish you Godspeed in that effort and the very best of success.

Let me touch on the issue of thermal pollution because this has been very much in our minds of late, as a result of the announcement of consortium of Vermont Power Companies of the possibility of constructing an atomic powerplant on Lake Champlain.

I was very interested to see the recommended standards that the Federal people have produced today with respect to thermal pollution. But I think, as I read them, they do not purport to deal with the question of volume. It is quite one thing to talk about a temperature rise of 3° on an average basis, over a period of time, when you are talking about a few thousand gallons an hour or a few thousand gallons a minute. But the facility being proposed for Lake Champlain would be in the vicinity of 600,000 gallons a minute. From the report that I have been able to read on the question of thermal pollution, and, in particular, the study - a very preliminary study which has been made by scientists and engineers from Cornell University with respect to Cayuga Lake - I think the problem of volume is an exceedingly important one. I would like to ask, in formulating the standards that you have recommended whether any consideration has been given to the question of what would be the permissible volume amounts of water that could be allowed to enter Lake Champlain from such a facility. It is one thing to talk of 200 gallons a second; it is quite another thing to talk of 10,000 gallons a second. From the evidence and the position that has been taken by the gentlemen at Cornell with respect to a smaller plant on Lake Cayuga, we feel, on the basis of the existing evidence, that a very serious threat is posed to Lake Champlain by the very volume of these heated waters, even though they would be kept within the temperature limits which you have suggested.

Finally, might I say - if you will, I have a few extra copies - I don't see any necessity of putting them in the record but I have a few extra copies for the benefit of any members of this group who have not already seen the report by the Cornell group. Finally, I think our job is one of trying to educate the public and trying to educate our political representatives and trying to work with you people, as best we can; and I think a great deal could be done and a great deal of help in our efforts could be done if there was some common use of classifications as regards Lake Champlain.

It is really only today with the benefit of the presentation that has been made comparatively short that I have been able to see that "AA" waters in New York are really roughly the equivalent of "B" waters in Vermont. I think it would be very helpful if the gentlemen from New York and the gentlemen from Vermont, as regards either State waters - and this is the Lake Champlain Basin - could agree on a common nomenclature. It would help the public and it would help us a great deal.

In addition, it seems to me, it would also be very helpful to know not only how the waters are classified, but also what is the existing quality of the water in any given area. I think that figures of this nature do exist in Vermont. I have not yet seen any from New York. So we would like to know. In my area of Willsboro, for example, we have "A" and "AA" water and we want to know whether the water today meets those standards - whether it is "B", "C" or "D". This is a very, very helpful tool in being able to go to local officials in local communities and say, "Look, this is how far off the standards you are; something has got to be done." This would be a helpful tool to us.

Finally, I hope that the Vermont and New York authorities will continue to cooperate with each other. We would certainly welcome the opportunity of having meetings at which citizen's groups like ourselves - and, frankly, we are the only one that exists with this kind of concern for the Lake Champlain Basin - could attend, so that we knew what was going on and we knew what your problems were and we could tell you what we knew about certain conditions and bring the force of public opinion and our large membership and access to the press, etc., to bear in a common effort.

In that connection, I think that when you get into specific things, for example, the boating laws that have been announced in New York, which I understand conform to the Vermont standards with respect to holding tanks and incinerators, very few people know about this in New York. We would like to do our best to publicize this fact - get the news across to marinas that they have got to provide some kind of a honey wagon or pump-out facility if they are going to have holding tanks and do our best to try to help in getting a uniform system of enforcement, so that maybe some one or two people can do the work for both Vermont and New York instead of having a duplication of effort. We think that form of cooperation is exceedingly useful and ought to be pursued, and, gentlemen, we will do everything in our power to assist you in that regard.

One final point with respect to thermal pollution. I believe, Mr. Haberer, it was announced a couple of weeks ago that your Department was about to release new thermal pollution standards as regards New York. If my memory serves me properly, the standards as set forth in your presentation here today reflect the old basis and not the new basis. In my judgement, the old New York standards on thermal pollution, particularly as regards lakes, are significantly inadequate. I wonder if you are in a position, as a result of the conferences you have had within your own Department, to indicate today what those new standards might be. I understood that a proposal was going to go to public hearing and that the proposal was going to be released about the 7th of November. It may be that I have overlooked it but I haven't seen it forthcoming.

So, let me say that we stand foursquare behind you. We are very anxious that the situation in Ticonderoga be cleaned up. We feel that Lake Champlain has a chance to be saved, but it is going to require a great deal of effort by everyone, and we are here to assist you in every way we possibly can. Thank you.

And I have a few booklets describing the Lake Champlain Committee, which, again, I will leave with you - particularly the gentlemen from Washington who are not as familiar with our badgering position as our friends here in New York and Vermont. Thank you very much.

MR. HABERER: Thank you, Mr. Paine.

Mr. Chairman, I wonder if we could have Dr. Tarzwell reply to the question Mr. Paine raised with regard to standards and, particularly, on the quantity of water.

MR. KLASHMAN: We certainly could recall him. Dr. Tarzwell, would you come back? Dr. Clarence Tarzwell is being recalled. Do you want us to rephrase that question?

DR. TARZWELL: I heard it in regard to volume.

MR. KLASHMAN: Do you want to restate it?

DR. TARZWELL: The question was: In our recommending water quality requirements with regard to temperature in lakes, did we take into consideration the volume of the effluent as well as the temperature? The answer is yes. Because there are two things governing it: It is the temperature of the water you are releasing, plus the volume. And this volume with its temperature, the requirements are that it does not raise the temperature of the epilimnion more than 3° above the monthly average of the daily maximum. So it does take volume into consideration.

MR. PAINE: If I may - but over how large an area in a stream, is much more easy to define this. Now you have an enormous lake and it is perfectly clear that the effluent from an atomic plant at Charlotte isn't going to raise the temperature of the surface level of the water in Plattsburgh, but it may do it for a wide area around the plant. Now, are we talking just in a mixing zone? Is there some way that we can define the limits of this thing? Because if you take the surface of the lake as a whole, they can make an appalling mess out of the five miles of shoreline but leave the rest of it largely untouched? Are there some specific criteria dealing with lakes as opposed to rivers that would be helpful, do you think?

DR. TARZWELL: No. The Committee did not deal with mixing zones because that is an administrative prerogative. We felt that the mixing zones would be judged by the State authorities in control, taking into consideration the local conditions. This 3° is outside any allowable zone of mixing. It is the temperature for the upper surface water at the epilimnion.

MR. PAINE: Your mixing zone could have substantially higher temperature?

DR. TARZWELL: Well, yes. It depends on what the States decide in regard to this.

MR. KLASHMAN: It is what the States decide separately?

DR. TARZWELL: Yes.

MR. KLASHMAN: Do you want to talk, Dr. Tarzwell, about the limits that you mentioned?

DR. TARZWELL: You mean in regard to the special fishes?

MR. KLASHMAN: As I understand it, your recommendations included not only a possible temperature rise, but also an upper limit that couldn't be exceeded in any case.

DR. TARZWELL: That is true. For instance Page 43 of this Water Quality Criteria for the Committee, it specified that. It says here, recommended maximum temperature not to be exceeded for various species of fish as given in Table 3. In other words, if you were up to the limit in the lake for the species that you have there, it means you couldn't increase it any. For instance, 84° for the growth of pike, perch, walleye, smallmouth bass and sauger, 84° is the peak limit set. That means it can't go higher if you are going to meet the requirements. Then, of course, also the seasonal thing comes in because of the spawning of egg development of white and yellow and spotted bass, 75°, growth, etc. and it is hoped that these species can be added to as we get more data but this is governing, and if you have certain species that are improtant like the walleye, why, as indicated here, the upper temperature is 84° and this would be maintained even if the lake was already there without the addition of heat, why then that is more or less that if you are going to maintain it for walleye. Is that clear?

MR. HABERER: Dr. Tarzwell, then the recommendation in the Federal report, Item No. B under 1, is not in itself sufficient criteria to determine the amount of heat that will return into the lake because there is no upper limit specified. It is purely a 3° rise?

DR. TARZWELL: You are speaking of this report?

MR. HABERER: Yes.

DR. TARZWELL: Well, it didn't deal with what we had for fishes, no.

MR. HABERER: Something would have to be added to this?

DR. TARZWELL: That is right.

MR. KLASHMAN: In other words, there would have to be some upper limits added by the Conferees and there would have to be some discussion about a mixing zone?

DR. TARZWELL: Yes.

MR. KLASHMAN: Are you finished with Dr. Tarzwell?

MR. HABERER: Yes.

MR. KLASHMAN: Thank you, Dr. Tarzwell.

MR. HABERER: By the way, are there any elected officials from New York State here who would like to be recognized? I do not recognize any, but I will recognize any who are elected. I guess not. All right, the next I have here is

Mr. Rand of International Paper Company. Mr. Rand, do you have a statement that you would like to give at this time?

MR. RAND: I have a prepared statement which I will read.

STATEMENT OF GEORGE RAND, VICE PRESIDENT OF
INTERNATIONAL PAPER COMPANY, NEW YORK

MR. RAND: My name is George Rand. I am a Vice President of International Paper Company.

International Paper Company has operated a pulp and paper mill at Ticonderoga, New York, since 1925. This mill was originally built in 1882 and has been substantially added to and modernized since that time.

The site of the present Ticonderoga mill in the center of town is restricted and basically unsatisfactory as a location for a modern pulp and paper mill -- particularly since no space is available for the construction of an adequate wastewater treatment plant.

The company is presently constructing a large, modern mill about four miles north of the village. As this mill is completed, operations of the present Ticonderoga mill will be phased out, and we expect the mill will be shut down during 1971. Effluent discharge from the old mill will be sharply reduced during the phase out period, beginning in 1970 and eliminated when the mill is shut down.

A great deal of costly planning and study to achieve optimum standards for water management at the new mill has been conducted with the assistance of nationally-recognized consultants on water management. Throughout the planning and engineering phase, our technical staff has worked closely with the New York State Department of Health. The Department's specialists have been involved at every stage.

We have also discussed our plans with officials of the State of Vermont and with officials of the U. S. Department of the Interior. We have made the general public aware of our plans through civic meetings and releases to the press.

Only last week, the President of International Paper Company spoke about these matters in some detail before the Annual Meeting of the Glens Falls Chamber of Commerce. He described a number of the steps we are taking at the new mill to construct a properly designed waste treatment plant to handle our effluent.

He told the audience that effluent from the new mill would be treated and diffused in the lake in such a manner that the biological and aesthetic values of the lake will not be altered.

He concluded, "I can tell you we expect to meet the standards set for the lake."

I would now like to go into more detail on some of the specific features of our planned installation.

First, a large pilot plant was constructed at the existing mill more than two years ago where we could simulate the treatment requirements of the new mill. A computer was programmed with data developed by the company as well as data from Federal and State surveys of water conditions in Lake Champlain. We were able to construct mathematical models of various treatment methods under varying lake conditions. These studies are the basis for the design of the treatment plant at the new mill.

Together, the pilot plant and the lake study were used to develop a total waste handling system to minimize the effects that the discharge might have on the established and projected water uses assigned to this portion of Lake Champlain.

In July this year, a complete plan was prepared and submitted to New York authorities for their approval. This preliminary plan has been approved by the Health Department of New York State. It provides for separate treatment of sanitary waste and industrial waste.

All sanitary waste will receive a high degree of treatment of the type provided by modern municipal waste control facilities. It will be chlorinated to assure the elimination of any dangerous bacteria.

As for industrial waste, the quantity will be minimized by the use of the most modern devices to filter out and save all usable cellulose fiber and other materials before the process water leaves the mill for the treatment plant.

The mill discharge will be treated in the following sequence: by settling; biological treatment and aeration;

final settling and then discharge through a specially-designed diffuser pipe on the lake bottom.

The primary treatment plant consists of two 105' diameter clarifiers, 10' in depth, with a volume of 600,000 gallons each. Settleable solids and much suspended material will be disposed of by burning in a special boiler.

The effluent from the clarifiers then goes to a 14-acre lagoon, 1200' long by 500' in width, with a capacity of approximately 70 million gallons. This lagoon will be, in effect, a giant biological farm in which helpful bacteria will be grown and concentrated under ideal conditions. While the water is passing through the lagoon, the bacteria will act upon the organic materials, such as lignin, using them as food and converting the waste into an inoffensive liquid.

This system accelerates the natural biological process under controlled conditions. Included in the lagoon will be ten large aerators, each powered by a 60 HP motor to provide oxygen for the bacteria. These same aerators will also cool the water.

The final step in treatment is two clarifiers, each 130' in diameter, after which the purified effluent is discharged into the lake through the underwater diffusing system on the lake bottom referred to before.

This total installation represents a substantial proportion of our total investment in the mill. On completion it should be one of the most modern and effective in existence in any commercial operations, reflecting the latest state of the art.

The plant's effluent will be at such quality as not to interfere with the safe use of Lake Champlain waters, and thereby accomplish the quality standards for which they are presently classified.

MR. KLASHMAN: I wonder if I might ask a few questions, Mr. Rand. Some of the questions I ask, you may wish to have someone else answer or you may wish to defer your reply, but I will ask them. Can you tell us, Mr. Rand, did any pulping operations exist on the site you are on now prior to 1882?

MR. RAND: I believe there were certain sawmills on the Creek prior to that time.

MR. KLASHMAN: May I have that confirmed?

FROM THE FLOOR: There were 25.

MR. KLASHMAN: In what year?

FROM THE FLOOR: Starting in 1817, the first one.

MR. RAND: There were a considerable number of lumber operations on the river prior to the setup of paper mill operations.

MR. KLASHMAN: The question I am asking, of course, is: The sludge deposits that exist in the Lake, are they due to the International Paper Company operations or due to prior operations, or don't you know?

MR. RAND: I would take the Fifth on that, I think. But I must say that it is very difficult for me to imagine that a portion of this sludge bank must have been in existence prior to the time I was born. Of my own knowledge, I am not aware. We have no way of evaluating the composition of this sludge bank.

MR. KLASHMAN: But a substantial part of the sludge deposits are from the operations since 1982.

MR. RAND: I think that is a fair statement. The sludge bank is composed, as in any delta of any stream, of a variety of materials which have come down through the years.

MR. KLASHMAN: The second question I wanted to ask, Mr. Rand, was: What would be the gallons per day of waste discharged from the new mill?

MR. RAND: 21 million gallons.

MR. KLASHMAN: 21 million gallons a day. In other words, the lagoons, the aerated lagoons would have a two and a half day retention period?

MR. RAND: That's correct. This is designed in accordance, and I am sorry that our consultant cannot be here. He was fogbound or snowbound or something and I would prefer to defer these questions to him.

MR. KLASHMAN: It is not only that question, but any of these questions - if you prefer to submit an answer later, we would certainly understand, under the circumstances.

MR. RAND: This ratio you speak of is substantially correct and is arrived at through the recycling of bacteria to get the maximum efficiency for this system.

MR. KLASHMAN: Do you know what percent of BOD and suspended solids the design calls for removing in the proposed treatment? Did the engineers come up with this figure? The percent of BOD and suspended solids?

MR. RAND: Mr. Drummond.

MR. DRUMMOND: I would like to correct Mr. Klashman in one aspect and that is that the retention in our aerated lagoon will be three and a half days rather than two and a half days.

MR. KLASHMAN: The way I got this two and a half was this 21 million gallons per day divided by 70; it would be three and a half. I stand corrected.

MR. DRUMMOND: The plant is designed for BOD removal of 90 percent.

MR. KLASHMAN: And suspended solids would be 90?

MR. DRUMMOND: Yes. We believe that we definitely will meet the New York standards for secondary treatment which is 75 to 95 percent of BOD removal and suspended solids.

MR. KLASHMAN: But the plant actually is designed for 90?

MR. DRUMMOND: Yes.

MR. KLASHMAN: Thank you.

MR. DRUMMOND: Actually 90+ but it is designed for 90.

MR. KLASHMAN: The next question I wanted to raise was this: Are the sanitary wastes to be discharged from the new mill, are these to be discharged separately to the lake or are they to be discharged back into the process water and reused?

MR. RAND: They will be discharged separately.

MR. DRUMMOND: Excuse me, I don't get "into the lake". Do you mean separately into the lake?

MR. KLASHMAN: Yes, that is the question. Are those going to be mixed with the industrial wastes from the plant, or will they be discharged separately?

MR. DRUMMOND: At the moment they are going to be discharged directly to the lake. The decision has actually not been made, but it is thought that the chlorinated sanitary waste would include in it aeration of it. I don't know whether the decision has finally been made on it or not.

MR. KLASHMAN: I might tell you why I am raising the question. In those operations that we are familiar with in the Pacific Northwest and in other parts of the country, where there are sanitary wastes mixed with industrial wastes from a pulp and paper mill, the high volume of sugars and nutrients are such that you will get growths, perhaps, even with a chlorinated effluent, depending on what type of bacteria load you have in the effluent when it is discharged. That is why I am asking this question. As I understand it. at this time, you are proposing a separate discharge? You are considering the possibility?

MR. DRUMMOND: It could be either way.

MR. KLASHMAN: All right. Mr. Drummond, would you please identify yourself for the record?

MR. DRUMMOND: Yes. I am Robert Drummond, International Paper Company.

MR. KLASHMAN: Thank you, Mr. Drummond.

MR. HABERER: Do you have any further questions?

MR. KLASHMAN: I have one last question. The point of discharge into the lake, will this be in New York or in Vermont?

MR. RAND: It will be in New York.

MR. KLASHMAN: How close to the border?

MR. RAND: I don't know in actual feet.

MR. KLASHMAN: Has it been decided yet?

MR. DRUMMOND: Can I answer that one?

MR. KLASHMAN: Yes.

MR. DRUMMOND: It is my understanding that the border is the deepest part of the lake, the deepest part of the channel. That is water between Vermont and New York and the design we have at the moment is that our pipe, the effluent pipe, will be on the New York side.

MR. KLASHMAN: But it will be just at the border?

MR. DRUMMOND: Yes, but I can't tell you how many yards it will be.

MR. KLASHMAN: I understand.

MR. DRUMMOND: I don't think it matters because we have a 900 ft. diffusion pipe at our end of the lake, but the end of this pipe will be on the New York State side.

MR. KLASHMAN: Do you know what the depth of the lake is, Mr. Drummond, at that point?

MR. DRUMMOND: I would not like to be quoted, but, to my knowledge, it is close to 23 feet deep. I am not absolutely sure.

MR. KLASHMAN: Do you have any knowledge whether there is any stratification in that part of the lake?

MR. DRUMMOND: There is no stratification.

MR. KLASHMAN: There is no stratification?

MR. DRUMMOND: No. We have had tests run and there was no stratification.

MR. KLASHMAN: These tests that you ran or were run for you, were they run over a period of time, over different periods?

MR. DRUMMOND: We have been running them all summer.

MR. KLASHMAN: I mean, have they gone through a year's cycle?

MR. DRUMMOND: Over the years they have, yes.

MR. KLASHMAN: Would we be able to get some of this data showing this; I mean your figures that show there is no stratification?

MR. DRUMMOND: I would say we would have it available.

MR. KLASHMAN: I wonder, Mr. Rand, whether we could get some figures from you to support the report that there is no stratification?

MR. RAND: Yes.

MR. KLASHMAN: This will be inserted in the record when we receive it.

Mr. Thieme, I think you said you had a question of Mr. Rand.

MR. THIEME: I wonder if Mr. Rand would want to make any comment as to the temperature of the discharge. Since we have been talking so much about thermal pollution today, I thought maybe, if you happen to know. I don't want to force you into it but if you have it available.

MR. RAND: I do not have it available here today. All I can say is our consultants have designed the amount of aeration in the design of their mathematical models, etc., based on the various temperatures that the record shows exist in the lake on an annual basis and that this will meet the present temperature rise criteria, but at any given point of time I don't know. This will vary obviously during the year, depending on the ambient.

MR. KLASHMAN: I think we are concerned about what the engineers think about what the critical condition will be with the aeration in the lagoon and the 3 1/2 days period the wastes spend there, if there was any such.

MR. RAND: I refer it to Mr. Haberer. He has all of the facts that have been given on this.

MR. HABERER: I think what you are saying, Mr. Rand, is that the temperature of the discharge will meet the criteria of the Vermont standards at the present time.

MR. RAND: This is exactly what I am saying.

MR. KLASHMAN: Which is a 4° rise in temperature, is that right, Mr. Thieme?

MR. THIEME: Yes, it is 4° with 83° fixed maximum temperature.

MR. KLASHMAN: Mr. Thieme, did you have any questions?

MR. THIEME: My question was on the temperature, but they have already answered it.

MR. KLASHMAN: So that what Mr. Rand is saying is that their proposed discharge would meet the 4° and 83° maximum temperature.

Thank you very much, Mr. Rand.

MR. HABERER: I find that in my hurry here I did not make comments regarding Mr. Paine's two questions, which I feel were thrown out, and I should have made some comment on them, Mr. Chairman. So if you don't mind I would like to briefly discuss them. One was their wish for an opportunity to publicize the boat pollution program. I assure you that we would be very happy for anything you could do. There is Miss Mary Spargo in the audience here and she is handling our publicity and she will get in touch with you afterward. I would appreciate anything you can do. We are working through local engineers in the districts and in the region to publicize this and to inform the marinas what they have to do in order to take care of these wastes. So that we do have a program underfoot right now and this is a big problem to meet this date, a terrific problem; we recognize it. The new standards on thermal pollution have not been made. We have not held a hearing nor has a hearing been authorized at this time. It was decided we had to do some more internal thinking on it before we publicize what we hope to do about a hearing. We have been working very closely with the Federal boys on trying to come up with a standard which will meet their criteria, which will satisfy them and also be something that we in New York State, both the people and the fishing industry, can live with. I think those were the other questions you had.

MR. PAINE: We are going to put out a newsletter following this and we will pick up whatever you want us to pick up on the boat pollution matter and I will speak to them.

MR. HABERER: The last person I have is Mr. Morette. Mr. Morette, would you like to make a statement at this time?

MR. MORETTE: Well, actually, I wanted to hear you speak first, Mr. Haberer.

MR. HABERER: I have done all my speaking.

Now, after Mr. Morette, I have no one else that I had any notification from that they wish to speak. If a letter was sent in to me and is now on my desk and you happen to be here and know this, I would be very happy to give you an opportunity, but this completes the list of people who have written in for an opportunity.

STATEMENT OF EDMUND MORETTE, REPRESENTING THE NEW YORK CONSERVATION COUNCIL AND ITS PRESIDENT, MARTIN TURNER

MR. MORETTE: My name is Edmund Morette and I am representing the New York Conservation Council and the President Martin Turner, the newly elected President. I am Past President as of about three weeks ago and I am representing Mr. Turner and the Council. I live in Ticonderoga, New York, which seems to be getting all the discussion here today.

The State Conservation Council's position is very clear on pollution. We were one of the instigators of the Pure Water Act of the State of New York and assisted the Governor in putting the Act through.

We were at the hearing which you held in Ticonderoga for the reclassification of Lake Champlain, from the Champlain Bridge down to Whitehall, and we supported the classifications everyone did to Grade "B". So the position of the conservation groups - the hunters, the fishermen, the organized sportsmen of our State, who constitute over 350,000 paid members - is very clear as to where we stand.

I hate to say this, but I want to say to Mr. Haberer, from my remarks, I didn't want him to think I had to hear everything he said or that I am supposed to know everything he knows. I didn't want to speak before him. I was out to lunch and maybe that is where I missed your presentation.

We have worked very closely with the Health Department. There is no better bunch of inspectors in the State of New York than the men who go hunting and fishing every day. He is the best arm that the State Health Department has.

But I think when we get all done today that we have missed the whole crux of this whole thing and, Mr. Klashman, I am going to deviate a little bit; I hope you will bear with me. We have a company in the area that is building a brand new mill, $76 million plus, and they are building it to the requirements and the standards of the State of New York and they have jacked them up on them two or three times. I know they have changed them, raised them up higher, and I have the impression - I didn't talk it over with Mr. Thieme - but I have the impression they are meeting his standards and they are willing to do anything that he wants done, within reason, so that they will not pollute the waters of Vermont, which is so close to the boundary line that you were talking about in the deepest part of the lake.

I think the thing we have got to bear in mind is that we are all against pollution. If these people - and, by the way, I think I should make it very clear; I didn't in the beginning - I don't work for International Paper Company; I never have. I have been very fortunate. I have worked for the State and for the Government, but I don't work there. I want to make that position clear, so that no one will think that I am a paid lobbyist here today. And I am available for questions afterwards.

But these people are building this plant, so the new plant does not seem to be any problem. I don't think it is going to be a problem for the Federal Government. I don't think it is going to be a problem for Vermont or New York. I think they will meet any questions that Mr. Paine from our Champlain Commission had in mind about the water. But I think we have got to use a little judgment here on this sludge. This seems to be the problem - the sludge. Vermont is worrying about the sludge that is in the main channel. We are worried about the sludge that is in Ticonderoga from the waterfall right to the mouth of Ft. Ticonderoga. It is over a mile. And I think the time has come when New York and Vermont and the Town and Village of Ticonderoga - you have been very generous to my town and I don't want to say anything bad about the Mayor, but, you know, in all fairness, we have contributed a great deal to that debris and that sludge that is down there. Our village and town has put it in there for 50 to 100 years. We have donated our share of what is down in that creek. We might as well be honest about it; it hasn't been mentioned here. Besides the sedimentation which has come from Lake George, and you will go back in history to the time of Thomas Jefferson when he came down through Ticonderoga and went up Lake Champlain, he told us how muddy and riley Lake Champlain was then. That is a matter of history - 1783, I believe. It wasn't clear water at any time that we know of in that era. But I think the thing is let's stop blaming, "Who done it?" and all this, "Who has put it there?" I think that what we have probably got to do is all of us sit down - the three agencies and the Paper Company and the Village of Ticonderoga - and let us sit down and get rid of the sludge. Let us remove it. I think if we all sat down at a friendly gathering, in the very near future, that we could work out a plan to remove this sludge from the creek and the channel.

I want to take a little credit here. About six months ago, I went to Washington. I talked to our Congressman and our Senator and I was responsible for requesting our Mayor to write a letter to our Congressman, because we thought the Corps of Engineers could do something.

I might say, some of them are here today and they were in Ticonderoga three weeks ago and they saw all the sludge, and we are going to New York in a few weeks to see the Chief of Engineers.

We believe a feasibility study can be made - that that sludge can be removed. We have a place to put it. We can put it to great recreation use - the sludge that we get out of the creek.

So I say, before we leave here today, I hope that the agencies here - I think that the Paper Company has been properly thrashed. If that was what somebody was looking for today, they got their thrashing and you got your ounce of blood. But I think from now on, after today, that we ought to get together and remove this sludge and encourage this company that is willing to spend $75 million to $100 million; supports the economy of about seven towns on our side; plus buying hundreds of thousands of dollars worth of lumber and wood in Vermont; a company that owns two of your greatest ski resorts in Vermont - I think somebody ought to start helping them a little bit. I say this as Past President of the Conservation Council and not deviating one inch from trying to stop pollution in our lake.

Thank you very much.

If anybody wants to ask me a question I will be available.

MR. KLASHMAN: Mr. Haberer, do you have any questions?

MR. HABERER: No.

MR. MORETTE: Thank you, Mr. Haberer, for the privilege of being here.

MR. KLASHMAN: Mr. Morette, first, nobody is thrashing anybody here. This is a Conference, not an "adversary" proceeding. Mr. Morette, do I understand that you are proposing that the Corps of Engineers at public expense remove the sludge that is in the lake now? Under what law, or is it some special law that you are proposing?

MR. MORETTE: Mr. Klashman, in 1895 our investigations proved that there was a project on the books to clean up that creek and channel.

MR. KLASHMAN: This is for navigation?

MR. MORETTE: For navigation. It was used for navigation for many years.

MR. KLASHMAN: Would that remove all the sludge?

MR. MORETTE: What, the dredging?

MR. KLASHMAN: Yes.

MR. MORETTE: It would probably remove as much as would stay there. It would probably remove 90 percent and the other 10 percent would be taken care of by the natural spring flushes.

MR. KLASHMAN: Thank you very much.

MR. HABERER: Thank you very much.

MR. KLASHMAN: Mr. Haberer, do you have any others?

MR.HABERER: No, I have no one else to call on. I will again ask if there is anyone who has asked for time and I have missed them. If not, that's it.

MR. PAINE: May I ask one more question?

MR. KLASHMAN: Mr. Paine, why don't you come up and we will recognize you again.

MR. PAINE: I think all of us are very conscious of the sludge problem and what has to be done about it. I think we are also conscious of the problem you have raised, sir, of how legally do you go about correcting a dredging? I hate to put Mr. Rand on the spot, as I appreciate his problems, but I am wondering if I.P. would be prepared to contribute a portion of the cost of dredging that sludge from the creek and from Lake Champlain if it was proved feasible to do so and if Federal and State and local monies were also put into the pot.

MR. KLASHMAN: Mr. Paine, I am afraid I am going to have to rule your question out of order. If Mr. Haberer wishes to ask that question he may.

MR. HABERER: How would you like to answer that question, Mr. Rand? It's a damn good question.

MR. RAND: I would rather not answer it now, Mr. Haberer.

MR. KLASHMAN: Is there anyone else here who has not been heard and would like to be heard?

(No response.)

If not, I am going to call for a recess and the Conferees will go into Executive Session. However, I believe it may be necessary to have a second meeting of this Executive Session at some later date, hopefully sometime in November, when we can have the Chairman back. If we are able within the next hour or so - I guess an hour and a half or two hours - to come up with firm recommendations of the Conferees, we will then reconvene about 4:30 or 5:00 o'clock.

MR. HABERER: Is that something we would come back here for?

MR. KLASHMAN: Yes, we will come back here at 5:00 o'clock.

MR. HABERER: If we make up our minds quicker, we will come back?

MR. KLASHMAN: If we make up our minds sooner, we will come back earlier. But we will come back at 5:00 o'clock and report back whether we have been able to come to any definite conclusions on the recommendations that were made. If not, it will be necessary at a later date to hold a second Executive Session of the Conferees out of which will come our recommendations for the Secretary.

We will adjourn at this moment until possibly 4:00 or 5:00 P.M.

(Whereupon the Conferees retired into Executive Session at 2:55 P.M., after which the Conference reconvened at 5:00 P.M.)

MR. KLASHMAN: The Conferees met in Executive Session and time did not permit our completing our mission.

However, I would like to report to the extent that we did.

Closing Statements

The Conferees agreed:

1. That the waters of Lake Champlain from the Champlain Canal in the south to the Canadian border to the north and that portion of its tributary basin which affects the Lake receives the discharge of treated and untreated wastes from industries, municipalities, Federal installations, individual septic tanks and cesspools, recreational and commercial boating and agricultural and land drainage.

2. As a result of these discharges the interstate waters of Lake Champlain and its tributaries are degraded below the classifications established by the States and approved by the Secretary by the presence of bacteria, solids, oxygen demanding materials and nutrients. In addition, some of these waters are affected by the accumulation of bottom sludge deposits and floating sludge masses. This pollution limits the use of these waters for such activities as recreational bathing, boating and general aesthetic enjoyment. Bacterial contamination, in particular, presents a health hazard to persons using these waters.

3. Pollution of interstate waters subject to abatement under Section 10 of the Federal Water Pollution Control Act, as amended, occurs in Lake Champlain: (1) in the vicinity of Ticonderoga Bay and on Lake Champlain from Chipmans Point to Larrabees Point, as the result of the discharge of untreated waste from the Village of Ticonderoga and from the International Paper Company plant; (2) near Whitehall, as the result of the

discharge of raw sewage from the Village of Whitehall; and (3) in the Poultney River Basin as a result of slate processing operations in Vermont and New York and treated and untreated wastes from the Village of Poultney, Vermont, and Granville, New York.

4. As the result of untreated industrial waste, several areas of Lake Champlain contain extensive sludge deposits. The major deposits affecting the waters of the neighboring States centered near the mouth of Ticonderoga Creek and are due mainly to the discharge of untreated paper mill wastes from the International Paper Company.

5. Both New York and Vermont have adopted water quality standards for Lake Champlain which have been approved by the Secretary of the Interior. Under these standards, orders have been issued or voluntary construction schedules established by the respective States for the abatement of all major waste sources, including those sources listed in Item 3 above. These schedules call for construction of remedial facilities by 1970, with the following exceptions: Port Henry, N.Y., Willsboro, N.Y. and Rouses Point, N.Y. by April 1972 and Alburg, Vermont by June 1971.

For recommendations, the Conferees feel that a further discussion is necessary and will meet on December 20 at a place to be announced, to discuss these further.

However, we did agree to two recommendations. The first is that we are recommending that cooperative studies shall be carried out in the vicinity of Ticonderoga Bay and completed by September 1, 1969, to determine the extent of sludge deposits, the need for removal and after the sludge deposits are removed, the ultimate disposition of the sludge and the estimated cost of removal.

Schedule for construction of remedial facilities established by the States under the Water Quality Standards and approved by the Secretary of the Interior shall be maintained as discussed in Paragraph 5 of our Summary and Conclusions.

The Conference stands adjourned at 5:15 P.M. and the Executive Session will be reconvened on December 19 after which we will recommend to the Secretary the measures we feel are necessary.

Thank you.

(Whereupon, at 5:15 P.M., the Conference was adjourned.)

(The above-mentioned December 19, 1968, Executive Session Conclusions and Recommendations follow.)

Conclusions and Recommendations

The conferees reconvened in Executive Session on December 19 and 20, 1968, at the John F. Kennedy Federal Building in Boston, Massachusetts. At that time the conferees, representing the States of New York and Vermont, the New England Interstate Water Pollution Control Commission, and the Federal Government, reached the following unanimous conclusions and recommendations:

1. The waters of Lake Champlain, from the Charplain Canal in the south to the Canadian Border to the north, and that portion of its tributary basin which affects the lake, receive the discharge of treated and untreated wastes from industries, municipalities, a Federal installation, individual septic tanks and cesspools, recreational and commercial boating, and agricultural and land drainage.

2. As a result of these discharges portions of the interstate waters of Lake Champlain and its tributaries are degraded below the classifications established by the States and approved by the Secretary of the Interior by the presence of bacteria, solids, oxygen demanding material and nutrients. In addition, some of these waters are affected by the accumulation of bottom sludge deposits and floating sludge masses. This pollution limits the use of these waters for such activities as recreational bathing, boating and general aesthetic enjoyment. Bacterial contamination, in particular, presents a health hazard to persons using these waters.

3. Pollution of interstate waters subject to abatement under Section 10 of the Federal Water Pollution Control Act, as amended, occurs in Lake Champlain: (1) in the vicinity of Ticonderoga Bay and on Lake Champlain from Chipmans Point to Larrabees Point, as the result of the discharge of untreated waste from the Village of Ticonderoga and from the International Paper Company plant; (2) near Whitehall, as the result of the discharge of raw sewage from the Village of Whitehall; and in the Poultney River Basin as a result of slate processing operations in Vermont and New York and treated and untreated wastes from the Village of Poultney, Vermont, and Granville, New York.

4. As the result of untreated industrial waste discharges, several areas of Lake Champlain contain extensive sludge deposits. The major deposits affecting the waters of Vermont are near the mouth of Ticonderoga Creek and are due mainly to the discharge of untreated paper mill wastes from the International Paper Company.

5. Both New York and Vermont have adopted water quality standards for Lake Champlain which have been approved by the Secretary of the Interior. Under these standards, orders have been issued or voluntary construction schedules established by the respective States for the abatement of all significant waste sources, including those sources listed in Item 3 above. These schedules call for construction of remedial facilities by 1970, with the following exceptions:

Port Henry, N. Y.	April 1972
Willsboro, N. Y.	April 1972
Rouses Point, N. Y.	April 1972
Alburg, Vt.	June 1971

The International Paper Company has requested a modification of the New York Health Commissioner's order involving the discharge from its Ticonderoga, New York mill. This request for modification is based on the termination of all waste discharges by July 1, 1971. This request is presently under consideration by the New York State Department of Health. The International Paper Company has agreed to install waste treatment facilities at its new pulp and paper mill just north of Ticonderoga, New York. This plant is designed to remove at least 90 percent BOD and suspended solids.

6. The water uses and standards of water quality for Lake Champlain adopted by New York and Vermont and approved by the Secretary of the Interior vary for contiguous waters. New York State has held a public hearing to upgrade its classification. This matter is now before the New York State Water Resources Commission.

7. Where New York or Vermont has designated its waters of Lake Champlain to be used for water supply with adequate treatment, swimming, the propagation of fish and wildlife or other uses, both States shall take action to insure that such uses will not be impaired.

8. All wastes discharged to the waters of the Lake Champlain Basin shall receive treatment adequate to insure

waste quality consistent with the water uses established. All waste treatment facilities discharging into the waters of Lake Champlain shall be designed to provide for substantially complete removal of all floatable and settleable material, a minimum removal of 85 percent of 5-day BOD, and suspended solids based on average design flow.

9. Adequate disinfection shall be provided as necessary to comply with the water uses established by State, Interstate and Federal water quality standards and programs.

10. Dissolved Oxygen shall not be less than 5.0 mg/l at the State line at any time. Daily and seasonal variations will be maintained.

11. The U. S. Department of the Interior in cooperation with the New York and Vermont water pollution control authorities and the New England Interstate Water Pollution Control Commission shall carry out studies in the vicinity of Ticonderoga Bay to be completed by September 1, 1969, to determine the extent of sludge deposits, the method of correction, the ultimate disposition of the sludge and the estimated cost of correction.

12. A Technical Committee of water pollution control representatives from the FWPCA, New York, Vermont, and the NEIWPCC is to be established which will report to the conferees within six months and make recommendations on the appropriateness of the establishing of water quality requirements at the State line between Vermont and New York, including

but not limited to dissolved oxygen, temperature and bacteria, and disinfection practices.

13. The conference may be reconvened at the call of the Chairman.

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